VOL. XIV No. 15 CHICAGO, OCTOBER 8, 1908 $3.00 PER YEAR

MOTOR AGE

CARS IN CHICAGO RELIABILITY RUN RIGID TEST

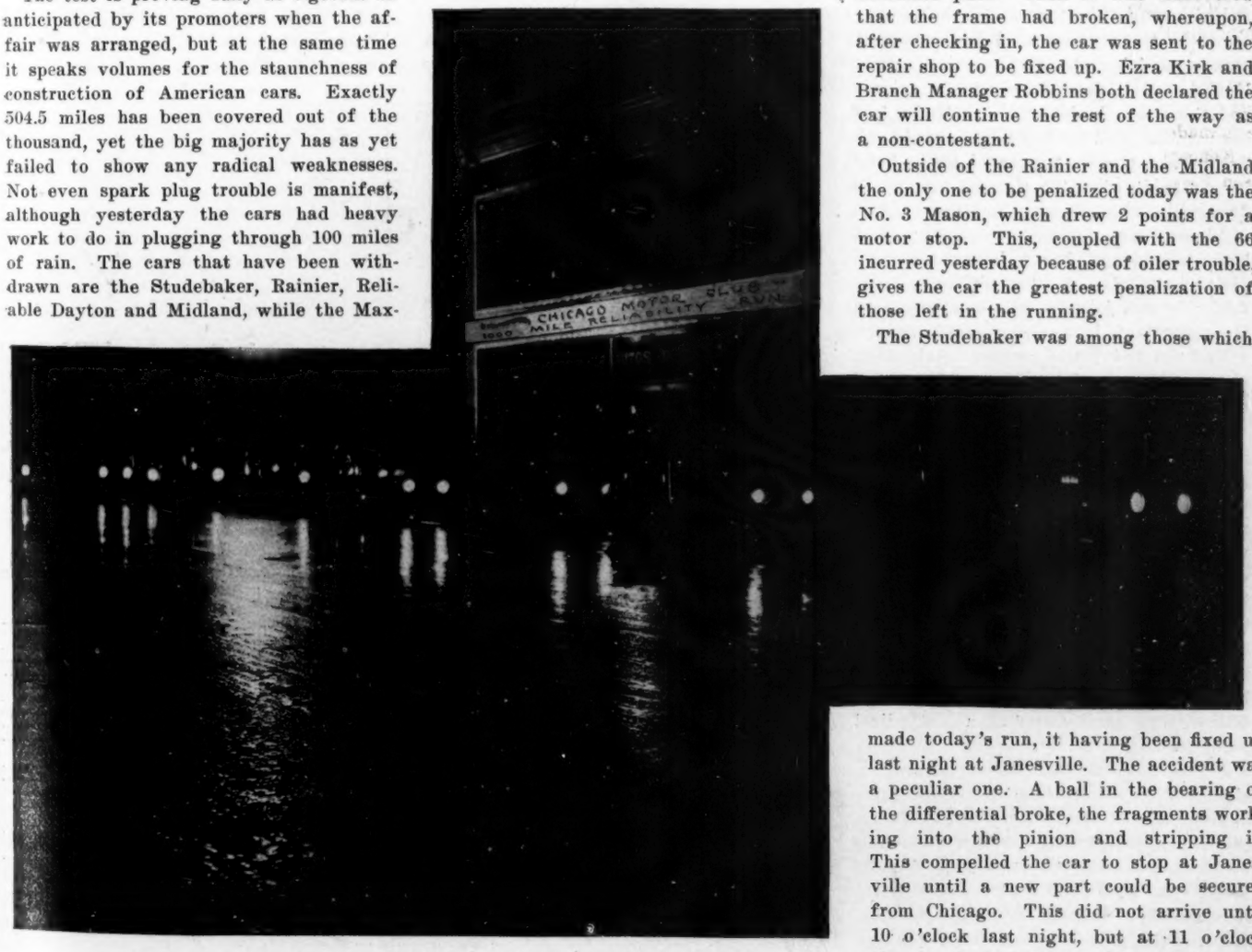
CHICAGO, Oct. 7—At the half-way mark in the 1,000-mile reliability test of the Chicago Motor Club there are eleven cars left with perfect scores; two others penalized but still in the running and three others which have been formally withdrawn but which will continue through to the end of this strenuous test as non-contestants. The seventeenth car got into trouble today and at a late hour tonight it was not known whether or not it would be possible to get it into shape to continue with the others tomorrow.

The test is proving fully as rigorous as anticipated by its promoters when the affair was arranged, but at the same time it speaks volumes for the staunchness of construction of American cars. Exactly 504.5 miles has been covered out of the thousand, yet the big majority has as yet failed to show any radical weaknesses. Not even spark plug trouble is manifest, although yesterday the cars had heavy work to do in plugging through 100 miles of rain. The cars that have been withdrawn are the Studebaker, Rainier, Reliable Dayton and Midland, while the Maxwell and one of the Masons have black marks charged up to them. The Rainier and Midland were put out in today's run of 241 miles over the Ottawa route. The roads were good most of the way, except that out near Somanauk the contestants ran into considerable new gravel which caused the Midland trouble. That car, driven by E. O. Hayes, was within a few miles of Somonauk, 60 miles from Chicago, and traveling at about 40 miles an hour, it is said. Hayes saw some fresh gravel and tried to swing into a side road. He struck some big ruts, which spilled his observer, Victor Halla, and put his car out of commission. Just what damage was done is not known officially, but those who passed say a front wheel and a spindle were broken.

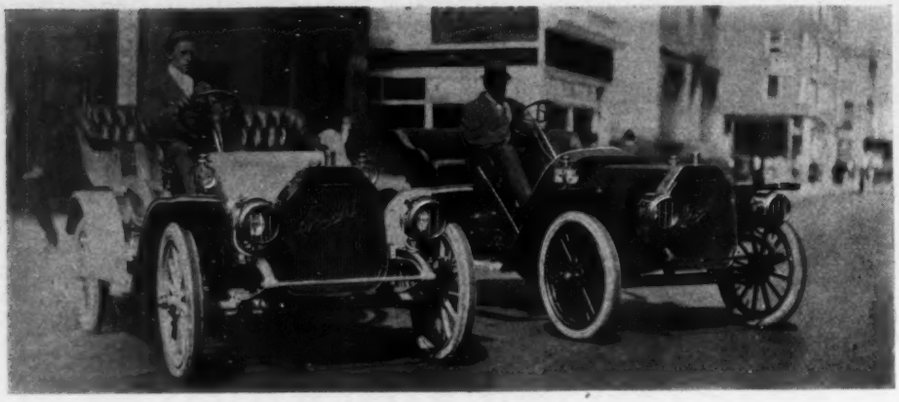
The Rainier undoubtedly cracked its frame yesterday over the north route, it being said it hit an obstruction in the road when it was going 60 miles an hour. The trouble did not really develop until this afternoon when the car was nearing Chicago, going over a good road and at a moderate pace. Then it was discovered that the frame had broken, whereupon, after checking in, the car was sent to the repair shop to be fixed up. Ezra Kirk and Branch Manager Robbins both declared the car will continue the rest of the way as a non-contestant.

Outside of the Rainier and the Midland the only one to be penalized today was the No. 3 Mason, which drew 2 points for a motor stop. This, coupled with the 66 incurred yesterday because of oiler trouble, gives the car the greatest penalization of those left in the running.

The Studebaker was among those which made today's run, it having been fixed up last night at Janesville. The accident was a peculiar one. A ball in the bearing of the differential broke, the fragments working into the pinion and stripping it. This compelled the car to stop at Janesville until a new part could be secured from Chicago. This did not arrive until 10 o'clock last night, but at 11 o'clock the repair had been made and the car



CARS LINED UP FOR START OF CHICAGO 1,000-MILE RELIABILITY



MASON CARS IN 1,000-MILE TEST

mile journey and there was only 5 hours in which to make it to be here in time to start with the others this morning. Piloted by a Janesville man, the car turned the trick and wheeled into line with ¾-hour to spare. It made today's run without the slightest trouble.

With the Reliable Dayton it was a case of a broken frame. Its makers heretofore have been using a wood frame but recently tried one made of pressed steel. In order to prepare for the long run it was necessary to mount gas lights and this was done without giving thought to the effect upon the frame. Six holes were bored in the pressed steel just where it arches to joint the front spring. Past Kenosha yesterday the car hit a culvert and the frame broke where the holes had been made. Had the car been turned back to Kenosha the damage could easily have been repaired, but the rig was sent on to Janesville, where it was compelled to stop. It finally was patched up and started back to Chicago, but a heavy fog compelled it to stop for the night at Rockford. It will join the run tomorrow as a non-contestant, it was announced tonight.

The run today was comparatively easy, although before the contestants got well clear of Chicago there was some confusion caused by a street being torn up for a sewer. However, everyone finally got past this point and it was not until coming into town that anyone else got a scare. Near La Grange some of the drivers who had been taking it easy suddenly discovered they had only an hour in which to get to Chicago, a hard task because of the congested traffic through which they had to pass on the city streets. Following this discovery there was a general hustling, even the drivers of the two Whites who usually run at a methodical pace, beating it mildly.

After the cars had been garaged tonight the technical committee did a little figuring on the fuel and oil consumption, for which a prize is offered, following which it gave out the following figures. As the cars were full-up with gasoline and oil when they reported yesterday morning and as they were again filled tonight one can gain a fair idea of the gasoline and oil consumed to make the 504 miles. The list is as follows:

No.	Gas 1st day	Gas 2d day	Oil	Oil
1	12*	..	6	..
2	16	18	4¾	6½
3	24	20	19¾	12½
4	19	15	5½	7
5	26	22	6½	6
6	26	..	12½	..
7	29	27	8	8
8	21	22½	7½	10½
9	19	13	10¾	6½
11	30	26	9	8
12	43	35	8	9
14	39	33	11	9¾
15	18	15	13	13
16	28	22	12	8
17	12*	41	5	19
19	34	31	0	½
20	32	30	1	6½

*To Janesville.

Gasoline is given in gallons; oil in pints.

So far all the contestants seem highly pleased with the run and its conditions. There has not been even a hint of a protest and the competitors all seem to realize it is the greatest task to which American-built motor cars ever have been put. Tomorrow's run goes into Indiana, the distance being 257 miles.

Four Penalized First Day

Chicago, Oct. 6—The much-talked-of 1,000-mile reliability run of the Chicago Motor Club, postponed from last June, started this morning, when seventeen of the nineteen cars entered left the club garage at 1324 Michigan avenue on the first leg of the 4-day journey and which also is the longest one of the four. It comprised a 262-mile circuit or rather square, with checking stations at each of the four corners—Kenosha, Janesville, Rochelle and Chicago—a run that was made extra hard because of the heavy rain into which the contestants ran at Janesville and which lasted for at least 100 miles of the trip.

Of the nineteen cars entered for the test two were scratched. The Knox people found at the last minute they could not get drivers and so were compelled to pass up the run, while one of the two Premier entries, the touring car, did not get here in time. Ray McNamara shipped the car from Kansas City a week ago Monday, but up to tonight he had not heard from it. The others, though, went to the post at

THE TWO PIERCE-ARROWS, GLIDDEN VETERANS

SCORE FOR FIRST TWO DAYS OF 1000-MILE RELIABILITY

No.	Car	Div.	Class	H. P.	Bore	Stroke	No. of Cyl.	Tires
1	Reliable-Dayton	1	A	21	3⅛	4½	2	Goodyear
2	Maxwell	1	B	20	5	5	2	Ajax
3	Mason	1	B	20	5	5	2	Hartford
4	Mason	2	E	20	5	5	2	Michelin
5	Apperson	1	C	30	4⅝	5	4	Diamond
6	Midland	1	C	32	4½	5¼	4	Diamond
7	Pierce-Arrow	1	D	43	4½	4¾	6	Goodrich
8	Haynes	1	D	36	4¾	5	4	Diamond
9	Premier	1	D	32	4½	4½	4	Diamond
11	Rainier	1	D	45	5	5¼	4	Fisk
12	White	1	G	30	3x6	4½	2	Fisk
14	White	1	G	30	3x6	4½	2	Diamond
15	Franklin	2	G	28	4¼	4	4	Goodrich
16	Haynes	2	G	36	4¾	5	4	Diamond
17	Studebaker	2	G	27	4¼	6¼	4	Diamond
19	Marmon	2	G	50	5⅝	5	4	Diamond
20	Pierce-Arrow	2	H	60	5	6½	6	Goodrich

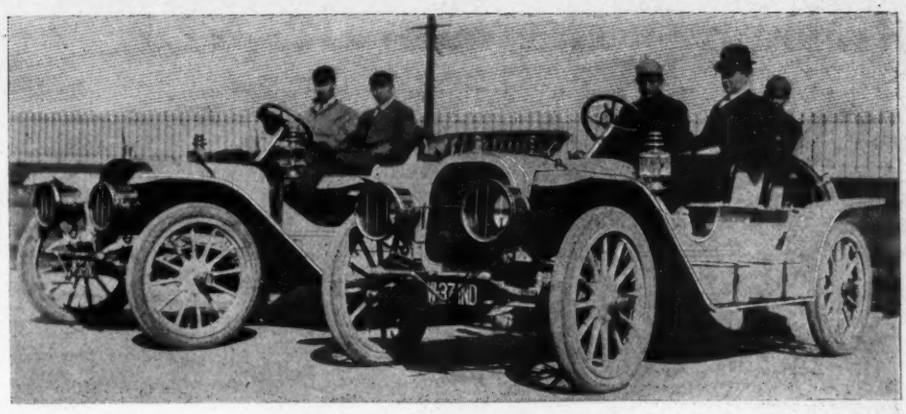
Division 1—Runabouts, four-passenger speed cars and baby tonneaus

Class A—Selling for less than $1,000; Class B—Selling for $1,000 to $1,999. Class C—Selling for $2,000 to $2,499
Class D—Selling for $2,500 to any limit

the scheduled time and made up a classy field. In it are two six-cylinder cars, both Pierce-Arrows and Glidden veterans. All the others are fours save the two Masons, the Maxwell and the Reliable Dayton, the last named a motor buggy.

These cars faced a severe ordeal. They have to average 250 miles a day for 4 consecutive days without being able to receive any attention whatsoever outside of having their fuel and water replenished at the controls and to be lubricated at night under the eyes of the observers. Every little bit of work will be penalized and at the end there will be a rigid scrutiny of the cars to discover what effect the long grind has had upon them. Still, notwithstanding all this, there are several tonight who are predicting there will be some perfect scores at the end. In addition to the car angle, there also is a prize offered by the Standard Oil Co. for fuel consumption, so a careful record is kept of the gasoline and oil used. The rubber men also are interested because there is a prize for them, this being the first time the tires have been brought to the front in this manner.

Judging by the way things turned out today there will not be many perfect-score cars left for the consideration of the technical board Saturday night, for of the seventeen starters four received demerits today. The Maxwell two-cylinder touring car, which is not equipped with an apron, drew 24 points through water getting into the carbureter. It cost 20 points for Muntwyler to break the seals and 4 more for making the adjustment. Muntwyler also had a narrow escape from being eliminated by a street car in one of the towns along the route, but luckily escaped without injury to anyone. Leitch in the No. 12 White steamer also had a close call. Unexpectedly he ran onto a railroad track just as an engine came whizzing along. His passengers jumped from the tonneau, while Leitch, seeing he would be ditched if he put on his brakes, let out a few notches of speed and just did beat the engine in his mad dash.

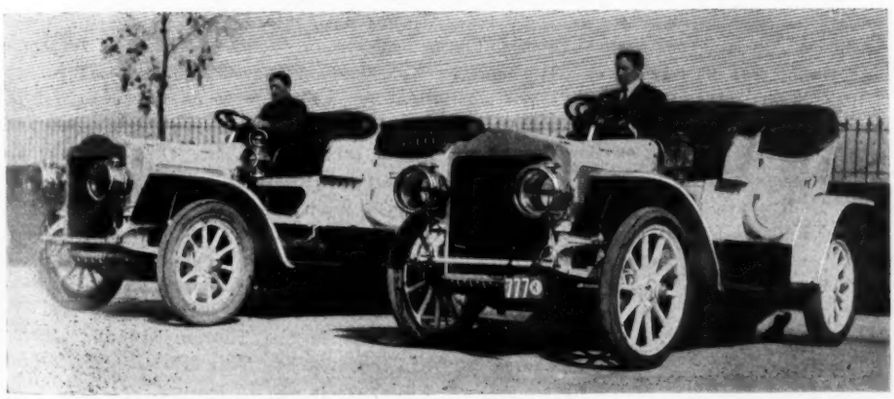


WAGONER AND NUTT, THE HAYNES ENTRY

The No. 3 Mason touring car had oiler trouble and this brought about 66 points penalization, for breaking seals and work. The Studebaker also drew black marks through a peculiar mishap. A broken ball stripped the pinion gear in the differential, causing the car to lay up in Janesville until a new part could be secured. Of course this meant a big penalty but it was said tonight that the car would be in the run tomorrow with the idea of going through the remaining 3 days of the test.

All the cars save the Studebaker and the Reliable Dayton got in before 7 o'clock tonight and all had perfect scores so far as making the controls on time was concerned. But the motor buggy was among the missing, and although the officials waited until midnight it did not report. Finally there came a message that the buggy had broken its frame near Janesville and had had to stop there for the night. It was explained, however, that while it would be impossible to go out with the others tomorrow the buggy would be in the fight Thursday and Friday as a non-contestant.

The run today was marked by the ease with which the big cars negotiated the unusual distance. The Diamond T confetti car made the 262 miles in 12 hours 15 minutes, about the same time as did the pilot, the Stoddard-Dayton. These two cars had an excuse for keeping on the move, but to those familiar with last year's 600-mile run it seemed ill-advised for the contesting cars to attempt such a wild pace. Yet a couple of them swung around the circuit in 12 hours, which included waits of about 1 hour at each of the three controls. The rain that fell did not touch Chicago or the committee would have lengthened the running schedule. However, as it turned out it did not make any difference, for the rain left only a light mud, with a hard road surface only an inch or so down. Stops were made to put on tire chains, but no one drew demerits for failure to reach controls on time. Some cases of tire trouble were reported but the Glidden rule is being used whereby time is taken out if the engine is kept running.



WHITE STEAMERS IN THE RELIABILITY

RUN OF THE CHICAGO MOTOR CLUB, OCTOBER 6-9

Entrant	Drivers	First Day	SecondDay
Reliable Dayton Motor Car Co.	C. L. Halladay	Out	*
Maxwell-Briscoe-Chicago Co	J. Muntwyler	24	Perfect
Mason Motor Car Co.	F. S. Duesenberg	66	2
Mason Motor Car Co.	F. M. Harn	Perfect	Perfect
J. F. Gunther Co.	N. McLain	Perfect	Perfect
Midland Motor Co.	Hayes and Hall	Perfect	Out
H. Paulman & Co.	Kumpf and Keller	Perfect	Perfect
Haynes Auto Co.	Frank Nutt	Perfect	Perfect
Premier Motor Co. of Illinois	R. McNamara	Perfect	Perfect
Rainier Motor Car Co	M. Hagelstine	Perfect	Out
White Co.	Leitch and Condon	Perfect	Perfect
White Co.	Sheridan and Phillips	Perfect	Perfect
H. H. Franklin Mfg. Co.	C. S. Carris	Perfect	Perfect
Haynes Auto Co.	L. Wagoner	Perfect	Perfect
Studebaker Bros. Mfg. Co.	G. Smithson	Out	*
Nordyke-Marmon Co.	Shafer and Stillman	Perfect	Perfect
H. Paulman & Co.	P. Hofmann	Perfect	Perfect

* Withdrawn but will continue as non-contestant

Division 2—Touring Cars

Class E—Cars costing up to $1,999. Class F—Cars costing $2,000 to $2,499. Class G—Cars costing $2,500 to $3,999 Class H—Cars costing $4,000 and up

SIMPLEX HANGS UP NEW 24-HOUR RECORD

NEW 24-HOUR RECORD SLATE

Hour	Car	New Record	Old Record
1	Simplex	55	52
2	Simplex	107	101
3	Renault	158	146
4	Renault	211	193
5	Renault	265	245
6	Renault	305	294
7	Renault	356	332
8	Renault	408	380
9	Renault	455	423
10	Simplex	508	465
11	Simplex	559	515
12	Renault	613	565
13	Simplex	658	616
14	Simplex	710	664
15	Simplex	761	706
16	Simplex	810	755
17	Simplex	856	803
18	Simplex	903	849
19	Simplex	949	883
20	Simplex	992	928
21	Simplex	1,041	972
22	Simplex	1,086	1,016
23	Simplex	1,131	1,060
24	Simplex	1,177	1,107

NEW YORK, Oct. 3—A 50-horsepower four-cylinder Simplex, entered by the Palmer & Singer Mfg. Co. and driven by George Robertson and Frank Lescault, evolved as the winner of the 24-hour race, promoted by the Motor Racing Association at the Brighton Beach mile course last Friday and Saturday. A 50-horsepower six-cylinder Lozier, nominated by Harry A. Lozier and piloted by Michener, Mulford and Cobe, which won the 24-hour race run a fortnight before over the same course, was second. A 72-horsepower six-cylinder Thomas Flyer, named by the Harry S. Houpt Co., with Roberts, Salzman and Winters for its crew, finished third. The three first cars all beat the previous world's record for a mile track of 1,107 miles, set up by Mulford and Cobe and Lozier "six" in the former race —the Simplex, with a score of 1,177 miles and an average of 49 miles an hour; the Lozier, with 1,125 miles and 46.83 average, and the Thomas, with 46.45 average. The following cars showed hour scores of 50 miles and over: Simplex, 57; Stearns, 57; Renault, 55; Lozier, 54; Zust, 53; Thomas Six, 52; Fiat, 52; Cleveland, 50; Allen-Kingston, 50.

A 45-horsepower Renault, entered by Paul LaCroix and driven by Lewis Strang and Charles Basle, figured prominently in the race for 17 hours, but was forced to retire the next hour owing to a broken connecting rod. It evolved as the one imminently serious disputant of the premiership of the Simplex in the race. It led, in fact, from the third to the twelfth hour both inclusive and incidentally took unto itself new records at all these points. At the end of the hour previous to its withdrawal, it had a score of 851 miles as against the previous record of 705 miles for 17 hours, with an average per hour of 50 miles. In the battle of the tires, the Michelin carried off first honors, second place falling to the Continental, and the third car having for its equipment the Diamond.

One fatality in the killing of a special policeman in the pursuit of his duty on the track and an unusual number of rather serious accidents to the drivers, marred the sport. In the third hour of the race T. F. Fickett, a special policeman employed by the promoters, started to cross the track from the field stand to the paddock, some say in pursuit of some boys encroaching on the track. Four cars were approaching almost abreast from around the turn at the head of the homestretch. According to Robertson's immediate report of the affair to the officials, Fickett was first struck by him, then by the Stearns, and then by the Cleveland. He was taken to the hospital tent, where it was found that he had both arms and the right leg fractured, four ribs broken and concussion of the brain. He died the next afternoon at the Coney Island Reception hospital. Upon his death Robertson was placed under technical arrest, though not put in custody.

The smashing of machines had begun, however, before the race had even started. At dusk following the afternoon sprints several cars came out on the course for trial spins. The Garford had forced its way on the track against rules, so says Tom Moore, and was ordered by him back into the paddock. It turned and ran up the course toward the camp's entrance gate. Just then Michener, who was rounding the turn with the four-cylinder Lozier at full speed, ran into the Garford. Neither car started in the races.

STRUGGLE FOR THE LEAD

Hour	Car	Miles	Former Record
1	Simplex	55	52
2	Simplex	107	101
3	Renault	158	146
4	Renault	211	193
5	Renault	265	245
6	Renault	305	294
7	Renault	356	332
8	Renault	408	380
9	Renault	455	423
10	Renault	506	465
11	Renault	558	513
12	Renault	613	565
13	Simplex	658	616
14	Simplex	710	664
15	Simplex	761	705
16	Simplex	810	755
17	Simplex	856	803
18	Simplex	903	840
19	Simplex	949	883
20	Simplex	992	928
21	Simplex	1,041	972
22	Simplex	1,086	1,016
23	Simplex	1,131	1,060
24	Simplex	1,177	1,107

A long list of mishaps followed to other cars and men that account for practically only half of the twelve starters in reality surviving the struggle to the end. The most serious occurred to the Zust, in which a mechanic suffered a broken arm. Several otners received cuts and bruises in other accidents.

On the pretense of awaiting repairs to the Garford that would make it possible for Mr. Hurlbert's car to compete, the start of the 24-hour race was delayed until 8:45 o'clock. At the shriek of the signalling horn, George Robertson made a quick jump and had sneaked across to the pole on the first turn with the Simplex before the other pilots knew just what had happened. He raced down the backstretch in the lead, followed by "Monty" Roberts in the Thomas Six and Laurent in the Stearns. This trio not only finished the first lap in this order, but kept it for 5 miles. Then Roberts sprinted to the fore and led at 10 miles in 11:32. In the early sprinting, however, the Simplex had

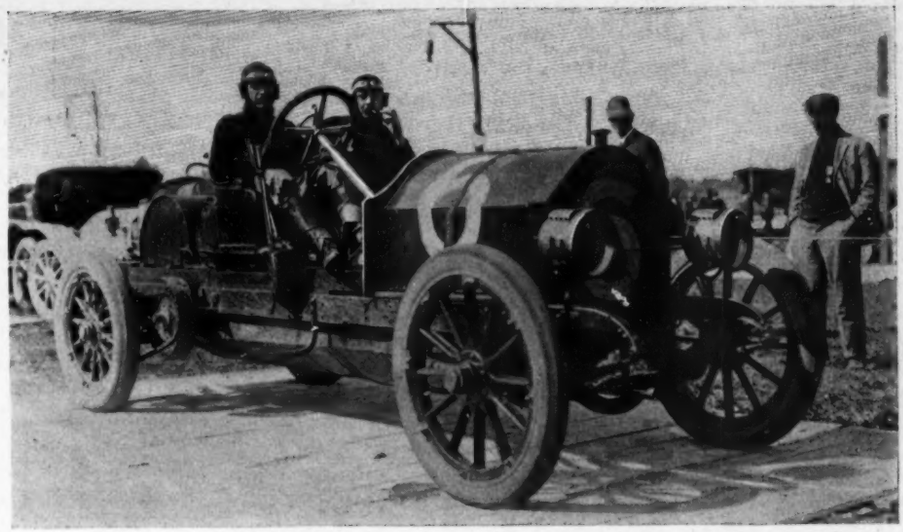
REMARKABLE NIGHT SCENE DURING PROGRESS OF BRIGHTON BEACH RACE

been showing miles in 58 seconds. Roberts led at 20 miles also in 22:23. Then Robertson went to the head and got a firm grip on the lead, and in the meanwhile Strang had worked through the ruck into second place. The Simplex made 25 miles in 27:33 and 50 miles in 54:31.

The order at the end of the first hour was Simplex, Strang, Lozier, Stearns, Roberts, Fiat. The same order exactly ruled at the end of the second hour. There was a gap of 12 miles between the leaders and the pursuing bunch. Thus early the chaff had been winnowed from the wheat and the likely leaders separated from those with but one or two exceptions with any chances of figuring otherwise than as mere "also rans" in such fast company as this pace-making sextet.

The promises of a knockout pace that should dispose of the weaker brethren early in the struggle were indeed being fulfilled. Robertson set a terrific clip with the Simplex, 55 miles the first hour and 107 the second, as against 52 and 101, the former figures. All this time Strang was hanging on like grim death with the Renault, with the record-holding and victorious Lozier chasing swiftly at their heels.

In the third hour Strang went to the fore and the Lozier got by the Simplex also. The next hour, however, the Simplex became the runner-up and "Monty" Roberts supplanted Mulford as pursuer. It was a stubborn all night and early morning struggle with the Renault setting the pace for the Simplex and the Lozier and Thomas alternating as pursuer. In the fifth hour the Fiat had forced itself into third place and was beginning to look dangerous, when its connecting rod calamity came and put it out of the running. The thirteenth hour proved a luckless one for Strang, for while the Renault was in camp the Simplex secured the lead that it never lost to the finish. From that point on the French car got no nearer the American machine than 3 miles; was at times 10 miles behind, but as a rule but 5 measly little miles to the bad that a stop for a tire or oil could wipe out if there had been one.



ROBERTSON AND LESCAULT, DRIVERS OF THE WINNING SIMPLEX

Roberts in endeavoring to close the 10-mile gap that separated the Thomas from the Lozier furnished the excitement of the wind-up. His game chase made him a favorite with the crowd. Roberts got as close as 4 miles to Michener in the twenty-third hour. It was this desperate sprinting to catch up, however, that put him ahead of the old figures and in the trio of record-breakers.

A half an hour before the finish the referee ordered the Stearns and Zust off the course under the rule permitting the barring of contestants that had no chance to win and might interfere with or endanger the other contestants.

The feature race of Friday afternoon's curtain-raising program was the 50-mile free-for-all. It had for starters the Barney Oldfield-Charley Soules combination, driving six and four-cylinder Stearns stock cars, respectively; Harry Kirkpatrick, Hotchkiss; Harry Roux, Mercedes; Steinwitz, Mercedes, and Ray Howard, Palmer & Singer. It was an easy one-two win for the "barn stormers" and the Stearns, Barney winning in the excellent time of 50:42, with Soules second in 51:34⅘; Roux third in 52:06, and the Palmer & Singer fourth in 54:46.

That Oldfield has lost none of his popularity with New Yorkers was evidenced by his cordial greeting when he appeared with a linen duster, the inevitable cigar, and his Stearns six to face the starter for the 5 miles for six-cylinder cars. He greatly pleased the grand stand by making a runaway of it by a quarter of a mile in 5:20⅘, despite the fact that he mistook the checkered last lap banner for the finish flag and had to be told to go on when he slowed down. His time for 4 miles was 3:52. Harry Kirkpatrick in a Hotchkiss stock car was second, and Ray Howard in a Palmer & Singer third.

The Fiat pair had a try against Christie's mile track record of :54. George Robertson in the Tornado scored 58 seconds and Ralph De Palma succeeded in the Cyclone with a mile in 52⅘ seconds.

In a match between these two at 10 miles the Cyclone was cut loose and won in 9:45, the Tornado having stopped in the fourth mile owing to a broken gasoline lead developing.

TABULAR STORY OF THE RECORD-BREAKING BRIGHTON BEACH 24-HOUR RACE, OCTOBER 2-3, 1908

No. Car Drivers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6—Simplex, Robertson and Lescault	55	107	143	198	255	302	350	401	454	508	559	612	658	710	761	810	856	903	949	992	1041	1086	1131	1177
2—Lozier, Mulford, Cobe and Michener	51	101	153	191	228	279	329	381	414	468	513	562	611	650	702	742	791	840	888	933	981	1031	1075	1125
8—Thomas, Roberts, Winter and Salzman	49	99	151	193	236	286	329	374	423	470	516	565	600	650	690	738	786	837	877	928	973	1022	1071	1115
11—Allen-Kingston, Lanwell, Rippigill and Pepperday	42	74	91	94	128	148	185	237	287	328	372	413	451	495	533	579	615	660	710	750	796	827	874	907
9—Cleveland, Chevrolet, Miller and McMann	43	88	137	187	231	263	263	263	263	266	266	266	267	311	347	361	392	437	475	513	543	583	625	632
5—Renault, Strang and Basle	54	105	158	211	265	305	356	408	455	506	558	613	655	705	758	802	857	888	Broke con. rod; withdrew					
4—Stearns, Laurent, Marquis and Oldfield	50	100	131	131	131	131	131	131	184	241	254	254	255	268	268	268	268	287	339	383	429	480	509	519
15—Zust, Post and Natjen	46	52	82	121	174	217	217	217	217	217	217	217	217	217	228	232	269	285	308	333	370	396	421	
7—Acme, Patschke and Rodgers	35	62	84	109	143	184	204	233	245	293	309	Withdrawn												
3—Fiat, De Palma, Capra and Hawley	48	99	167	185	237	283	303	Broke connecting rod; withdrawn																
14—Renault, Bloch and Clement	43	83	123	176	221	255	Overturned and destroyed by fire																	
12—Thomas, Martin and Blanchard	35	35	70	116	158	177	179	188	205	206	Withdrawn													
10—Garford, Young and Doty	..	...	...	...	...	...	...	...	...	...	...	...	43	47	Withdrawn									
Old record	52	101	146	193	245	294	332	380	423	465	515	565	616	664	706	755	803	849	883	928	972	1016	1060	1107

Published Weekly
The Class Journal Company
1200 Michigan Avenue, Chicago
New York Office, 239 West 39th Street

MOTOR AGE

Subscription Rates
United States and Mexico, per year, $3.00 Other countries including Canada, $5.00

Entered as Second-Class Matter September 19, 1899 at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

Reform Track Racing

THE achievement of speed has been one of the greatest incentives in the evolution and development of means of locomotion. In railroading the demand for a high-speed locomotive called for greater engineering than that demanded in the heavier, slower-speed type required for freight uses; in marine engineering, the perfection of the 26-knot an hour Lusitania called for a greater demand on the engineering department than the production of a slower speed but, perhaps, greater weight-carrying steamboat. So it has been, in other departments of locomotion, all engineers in these departments agreeing that speed in the end is one of the great tests, in fact, the supreme test of material, workmanship and design. Railroad engineers have found that it is not a difficult proposition to get steel rails that will withstand the heaviest freight service at medium speeds, but the greatest trouble is to get rails that will withstand a speed of 70 miles an hour, which some of the fastest trains make. In fact, it is common practice to take rails off the main passenger line which are discarded as useless and have them serve satisfactorily on heavy freight lines for years.

Remove Both Fences

IN the motor car business, the same holds true, and speed is one of the supreme tests. Unfortunately, in America, these tests have been conducted on the 1-mile circular race tracks, which the industry has inherited from the time-honored horse. These tracks in many parts of the country have been the deathbeds of some of the best drivers, and the wrecking grounds of scores of high-priced cars. In the majority of cases the inside fence, or "rail," has been the greatest offender, the cars running into this at the turn and being wrecked in the infield. There are, however, several cases on record in which the cars have plunged through the outer fence, but they are few in comparison with those that have departed from the track at the other side. If the use of the circular track system continues, then, the natural course to follow, to insure safety to the contestants, is to remove the inner fence, and the outer, too, for that matter. It is not clear why this has not been done in many cases, because the American Automobile Association stipulates that in endurance contests on circular tracks, "when the contests extend through any fraction of a period between sunset and sunrise greater than one-third thereof, the inner fence at the turn shall be removed and a false fencework of white canvas or other textile fabric, supported on light pegs, substituted." Following this precaution would, in not a few cases, have prevented serious accidents. In fact, there is no reason why this clause should not apply to contests on a circular track during the hours of daylight as well as when the illumination is by other means. It would be a most creditable performance to the A. A. A. to refuse absolutely to sanction any speed contest on a circular track in which the fences are not removed.

Road Racing Is Best

IF we must have speed contests, and the annual programs abroad seem to indicate that it is imperative, then, the more reasonable solution is to secure roadways on which these can be conducted, and the ten road contests which have, and some of which are to take place on American roads this year, will do much towards eliminating the circular track program. Conducting road meets, however, is expensive sport; whereas, meets on a circular track are good revenue producers. It is regrettable that in not a few cases race meets have developed into motordrome performances for the benefit of the purses of the promotors, rather than for the edification of the spectators and the benefit of the industry. But the completion of the Long Island parkway should revolutionize racing.

Multitudinous Motor Troubles

OF the multitude of motor troubles that the owners report from week to week to the factory, the selling branch, or the agent, over 90 per cent are due to faulty carburation and faulty lubrication. One owner's motor heats continually—he is feeding too much gasoline; another owner's motor heats equally bad—he is feeding too much oil; another owner's motor fails to give the power it did at the start—there is not enough oil; and the owner of a fourth car suffers lack of power due to insufficient gasoline. So the story goes, week in and week out. Too much gasoline, not enough gasoline; too much oil, not enough oil. In many cases the fault is not with the maker of the car, but the owner. In others the owner is free, and the car maker deserves the censure. The directions on the adjustment of a carbureter look extremely simple in print, but exceedingly difficult in accomplishing. It is an easy matter to say that the float must be so positioned on the stem that the gasoline stands just below the tip of the spraying nozzle, so that it will not overflow. But it is a much different matter in many carbureters to know when this is obtained. It is equally easy to give directions on the adjustment of the spring control auxiliary air-valve but much more difficult to secure the desired adjustment.

Use Only Good Oils

IN lubricating, the problem is a simpler one, in that it is generally easy to regulate the flow of oil in drops per minute. But with oiling the variables are temperature, and the grade of oil. Not infrequently it happens that the owner is not getting the oil he imagines he is. The lubricant he thinks he uses is one manufactured expressly to maintain its viscosity at high temperatures and pressures; whereas, the one he is actually using has a good viscosity in atmospheric conditions, but practically a minimum one within the cylinder of a motor. To avoid this trouble calls for care in the purchasing of oil, which, alone, will result in the elimination of a great many motor troubles.

An Efficient Oiling System

THE oiling system employed in some cars is directly responsible for the motor troubles, in spite of the best care given it. Some systems are so designed that it is absolutely impossible to furnish a uniform and adequate supply to the motor cylinders. With these it is either starve or feast, one of which is about as bad as the other. What is needed is enough, no more, and no less. The ideal system furnishes the proper amount, in the proper place, and at the proper time. With high-speed service and heavy work, more oil is needed, a condition which is not fulfilled by all systems. The proper oil level within the crankcase for a splash system is a simple-sounding phrase, but so few of the cars provide adequate means by which the driver can easily determine the exact oil level. If such means were provided, it would be an easy matter to maintain a theoretically correct oil supply, but it often happens such is not the case. At one time a gallon is put in which is supposed to do for many miles: when this is put in, too much oil is fed, and before it is assisted by an extra gallon, the motor has too little, so that it has passed through the entire gamut from starving or over- that it has passed through the entire gamut.

Graduated Fuel Adjustments

IN the carburation field more delicate and positive adjustments of the gasoline will have the result of reducing the fuel consumption, which is an item worthy of attainment. In connection with these adjustments should be scales of some nature by which the driver would know the exact point of adjustment. With suitable regulating scales, marking the adjustment of these parts, the owner will at least know whether the adjustment has varied or not, and will thereby have a guide to direct him.

COUNT CARS IN THE VANDERBILT CUP RACE

Ten American and Six Foreign Entries Now in Hand—Coupe de Voiturettes Results in France

NEW YORK, Oct. 2—Sixteen entries are known to have been made for the Vanderbilt cup race. It may be that the resolution of the racing board as to those drivers that competed in the unsanctioned meet at Brighton Beach on September 11 and 12 may reduce the present list by one or two, or perhaps, which is more probable, result in an increase should the suspended ones make their peace with the racing authorities. Pending the readjustment of the standing of the outlaw pilots, the Vanderbilt cup commission has delayed making public the exact status of the entry list for the Long Island classic. Thursday, October 1, was the day set for the closing of entries. On the preceding day the Locomobile Co. of America made good its promise by formally nominating the two racing cars it built for the last Vanderbilt contest. The Matheson Automobile Co. also added to its former entry that of the 90-horsepower Matheson that was a contender in the last Long Island contest. George Robertson, who piloted the Simplex to victory at Brighton Beach last Saturday, was named as the driver of the Locomobile. Mr. Riker, who was at Brighton Beach Saturday, stated positively that the company had failed to persuade Joseph Tracy to again take the wheel, but the application of several crack drivers for the moment was being considered. James B. Ryall, a Matheson track driver of experience, will be on the seat of the second car of the Matheson string. The nominations for the Vanderbilt race now number ten American and six imported cars, the entries previously being made up of three Mercedes, two Knoxes, a Matheson, a Brasier, a Mora, a Chadwick, an Acme, a Thomas, an Isotta, and a Renault.

Action in the matter of drivers who competed in the unsanctioned meet at Brighton Beach, September 11 and 12, was taken by the A. A. A. racing board at a meeting held last Saturday. Previous to their participation in the races in question, all drivers were notified that their competition would mean disqualification. Since the race, however, several of the suspended drivers with mounts in prospect for the Vanderbilt and sweepstakes have declared that they competed under a misapprehension. The board leniently decided to take them at their word and give them a chance to start anew with a clean slate by the adoption of the following resolution:

Whereas, Various persons have participated in races coming within the jurisdiction of the American Automobile Association, but for which no sanctions had been granted by that association; and

Whereas, It appears that from the statement of some of such persons that they participated in the said races under a misapprehension, be it

Resolved, That in the cases of such participants as were under the misapprehension referred to, their disqualifications, pursuant to the rules of the racing board of the American Automobile Association, be suspended to the extent of enabling them to participate in any race already sanctioned by the racing board, upon such persons filing a statement to the effect that they shall not hereafter participate in any manner or form in any race claimed by the association to be within its sole jurisdiction and for which no sanction has been granted by the racing board of the American Automobile Association.

In a word, the erring ones have been given a chance to clear themselves of disability for the Vanderbilt and sweepstakes by placing themselves on record as having pledged themselves not to compete hereafter in races not sanctioned by the national body over which it may claim jurisdiction.

Fast Time by Little Cars

Paris, Sept. 27—That it is not necessary to have cars of 120 horsepower to provide a good motor race is proved by the results of the coupe de voiturettes, run off last Sunday, over a distance of 248½ miles, near Compiegne. Naudin, in a one-lunger Sizaire-Naudin, limited to 100 millimeters —3.9 inches—bore, covered the distance in 5:14:8, being an average of 47½ miles an hour. Although it is not such fast going as was witnessed at the Dieppe voiturette race, the performance is more remarkable, for the Compiegne circuit necessitated at least 200 changes of gear or important reduction of speed for each of its eight rounds. Of the seventeen cars to finish the first six were driven by single-cylinder engines of 3.9 inches bore. Martini, the only foreign firm in the race, finished seventh, eighth and tenth with four-cylinder cars of 2.5 millimeters bore. At Dieppe the maximum bore for this type of engine was 2.4 inches; even with the extra allowance, however, it was manifest that there was a decided inferiority in power produced by the multiple compared with the single-cylinder engine. Martini, however, had the satisfaction of being awarded the special prize for the best performance by cars most nearly approaching commercial models, and of being the only firm besides Sizaire-Naudin to finish with a full team. Not even the Sizaire-Naudin engineers would maintain that the winning trio corresponded with commercial models. Bore having been limited to 3.9 inches, most firms were content to adopt a stroke of 7 inches; two firms went as high as 7.8 inches, but Sizaire-Naudin took the bold step of lengthening the stroke to 250 millimeters, which to give the exact English equivalent is 9.84 inches. It is the greatest ratio of stroke to bore ever adopted on a motor car, and was in the opinion of experts ridiculously exaggerated; results, however, proved conclusively that the Sizaire-Naudin people were right. To show that the long-stroke motor is the most advantageous, it is only necessary to mention that the order in which the cars finished was in direct ratio to the length of their stroke. Sizaire-Naudin finished first with 9.8 inches stroke; Lion-Peugeot was second with 7.8 inches; Corre and La Joyeuse followed, each with 6.2 inches stroke, and Alcyon was behind with 5.9 inches. The exaggerated bore of the Sizaire-Naudin cars made them the heaviest of the lot—1,700 pounds, compared with 1,345 pounds for one of the four-cylinder Martinis—and increased the height of their bonnet considerably. To reduce wind resistance, therefore, the plain copper-tube radiator was heightened in the same proportion, but narrowed until its width across the frame was not more than 7 inches, and the water tank which surmounted was terminated in a sharp point. An overhead exhaust valve of exceptionally large dimensions further increased the height by reason of it being carried in the head and operated by rocker arm. In all other features commercial standards were adopted, the cars having direct drive on all three speeds. The following is the order in which the eleven out of seventeen survivors finished the race.

FOUNDERS' WEEK STOCK CHASSIS RACE CUP

Car and Driver	Time
Sizaire-Naudin, Naudin	5:14:08
Sizaire-Naudin, Sizaire	5:21:20
Lion-Peugeot, Goux	5:43:50
Sizaire-Naudin, Leboux	5:43:53
Corre, Collomb	5:47:29
La Joyeuse, Taine	6:14:49
Martini, Sonvico	6:19:29
Martini, Beck	6:19:43
Guillemin le Gui, d'Avaray	6:35:13
Martini, Richard	6:36:16
Guillemin le Gui, Riviere	6:39:48

HOOSIERS RETURN FIFTEEN PERFECT SCORES

CONTROL AT FRENCH LICK, HOTEL IN BACKGROUND

INDIANAPOLIS, IND., Oct. 3—Of the twenty-six cars that started in the 2 days' reliability run last Thursday to French Lick and return, fifteen crossed the tape at University park here late yesterday afternoon with perfect scores. Considering the condition of the road, the steep hills encountered and the close rulings made by the technical committee, the result was surprising.

The run was made under the auspices of the Indianapolis Automobile Trade Association, the second to be conducted this season by that organization. The three classes included runabouts, touring cars, roadsters and a ten-passenger Rapid bus, entries being arranged according to catalog price. On Wednesday afternoon and evening the cars were turned over to the technical committee at University park, where they were garaged for the night, after the seals of the association had been affixed. The entries included thirteen in class A, for cars listing above $2,500; nine in class B, for cars listing from $1,200 to $2,500, and four in class C, for cars listing under $1,200 and for trucks.

Preceding the starting time of the cars entered Thursday morning, a Premier pilot car driven by Joe Moore and carrying Frank Staley, president of the association; an Overland confetti car in charge of P. D. Stubbs, secretary of the association, and a National, driven by Frank L. Moore, general manager of the Fisher Auto Co., carrying representatives of the press, left almost at daylight.

At 7 o'clock the first of the entries, a National roadster, driven by John Aitken, left the Indianapolis control for the 131-mile run to French Lick. This car, by the way, was also the first to reach that place. The other cars followed quickly, starting at 1-minute intervals, the last car leaving shortly before 7:30 o'clock. The first glimpse of rough roads was seen at the end of Madison avenue, in Indianapolis, but they became better as South Port was reached. From Indianapolis to Seymour the roads were in excellent condition, a heavy rain on Sunday night having settled the dust somewhat. A few stretches of fresh stone roads were encountered, but they were mostly short ones and proved no obstacle.

South of Seymour, however, the roads became worse. Sharp turns, high hills and long stretches of new crushed stone made careful driving imperative. The schedule time was 18 miles an hour for class A, 16 miles an hour for class B and 14 miles an hour for class C. Because of the condition of the roads, the cars were compelled to make much better time on good stretches of roads.

It was near Seymour that the only accident of any importance during the 2 days' run occurred. No. 20, a Maxwell touring car, driven by J. A. Newby, of Newcastle, crashed into the Oakland entry driven by Harry Hocker, in an effort to pass. The Maxwell was attempting to regain its position when the accident occurred. The Oakland was forced into a ditch, breaking

RECORDS MADE BY THE CARS IN 2-DAY RELIABILITY RUN OF THE INDIANAPOLIS DEALERS

CLASS A—CARS LISTING ABOVE $2,500

No.	Name of Car	H. P.	Car Model	Entrant	Driver	Score	Penalization
1	National	50	Roadster	Fisher Auto Co.	John Aitken	Perfect	
2	National	50	N	Fisher Auto Co.	Thos. Kincaid	Perfect	
3	National	50	N	Fisher Auto Co.	Harry Mone	16	Two plates on front spring broken
4	Studebaker	30	A	Willis-Haywood Holcomb Co.	F. B. Willis	2	Left rear fender loose
5	Packard	30	30	Willis-Haywood Holcomb Co.	Chas. Stultz	11	Starting crank bent; towed for starting
6	Marmon	50	50	Nordyke & Marmon Co.	H. G. Shafer	Perfect	
7	Marmon	50	50	Nordyke & Marmon Co.	H. Stilman	Perfect	
8	Haynes	60	U	Reagan Motor Car Co.	Robert Murden	10	Foot brakes not working
9	American	50	Roadster	American Motor Car Co.	Fred. I. Tone	5	Towed to start motor
10	Premier	30	30	Premier Motor Mfg. Co.	Harry Hammond	Perfect	
11	Premier	30	30	Premier Motor Mfg. Co.	Henry Letsinger	Perfect	
12	Premier	30	30	Premier Motor Mfg. Co.	Miss Elizabeth Love	Perfect	
14	Premier	30	30	Premier Motor Mfg. Co.	Frank Morrison	Perfect	

CLASS B—CARS LISTING $1,200 TO $2,500

17	Overland	30	32	Fisher Auto Co.	Henry Barnes	15	Foot brakes not working; towed for starting
18	Rambler	32	34	Hearsey-Willis Co.	Ted Collier	Perfect	
19	Mitchell	20	G	Hearsey-Willis Co.	Geo. Gastenau	Perfect	
20	Maxwell	24	K	Newby Auto Co., Newcastle	J. A. Newby	Perfect	
21	Maxwell	20	H	Maxwell-Briscoe Motor Co.	T. L. Marshall	Perfect	
23	Chalmers-Detroit	30	30	Chalmers-Detroit Auto Co.	J. H. Stickney	Perfect	
24	Oakland	20	20	Independent Auto Co.	Harry Hocker	Perfect	
25	Premier	24	24	Premier Motor Mfg. Co.	Miss Katrina Fertig	11	Adjusted coil and carbureter
26	Cartercar	20	A	Indianapolis Auto Co.	C. J. Haines	5	Nut off front spring shackle bolt

CLASS C—CARS LISTING UNDER $1,200 AND TRUCKS

27	Rapid	24	132	Indianapolis Motor Car Co.	Frank Grogan	4	Two lamps loose
28	Maxwell		LC	Fisher Auto Co.	O. J. Gronendyke	19	Reverse in transmission not working; carbureter adj.; broken secondary wire
29	Hassler	10	MB	Robert H. Hassler	Robt. H. Hassler	5	Towed to start motor
30	Reo	20	R	Gibson Auto Co.	E. L. Jacoby	Perfect	

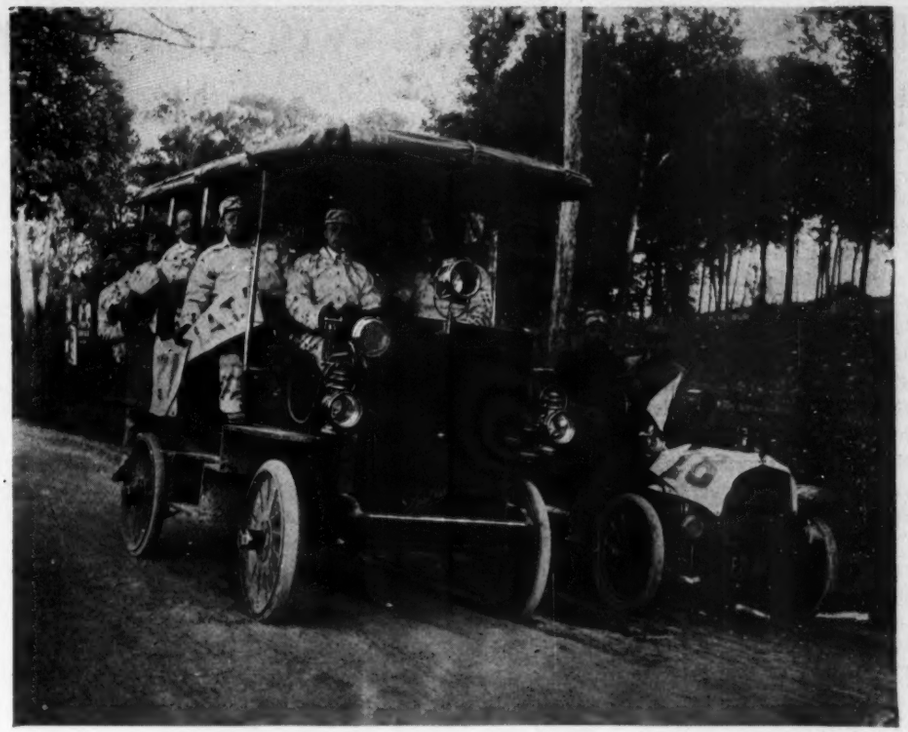
off a lamp and one of the fenders, but otherwise escaping injury. Because of the circumstances the damage did not count against the Oakland and it was awarded a perfect score.

Between Salem and French Lick the roads were more treacherous and hills more numerous. One of these, a long, winding grade, measured 3.6 miles, proving a severe test for the hill-climbing abilities of some of the entries. Accompanying these hills were invariably waterbreaks in the road, very much resembling hummocks, sometimes constructed for checking motor car speed. These waterbreaks, coming every few hundred feet, required the most careful driving and even with great care the passengers were shaken up considerably. The last 25 miles was the worst stretch of the first day's run. Much of the road was in bad condition and very rocky. Several small streams were forded and the narrow roads made the passing of farm and other vehicles difficult. Despite this fact, however, all of the entries reached French Lick on schedule, while some of them were from 40 to 50 minutes ahead.

The second day's run was about 9 miles shorter and was by way of Bloomington, Mitchell, Bedford and Martinsville, a distance of 122.2 miles. Leaving French Lick the roads were in perfect condition, but about 17 miles out some of the hills for which southern Indiana is famous were encountered. These were worse than any of those of the first day's run. The hills, for the most part, were winding, with sharp turns that prevented seeing ahead for only a very short distance. In addition they were rocky, with deep gullies on each side, leaving only a few feet for passing other vehicles. It was considered fortunate that no accidents resulted.

A feature of the run was the record made by a Rapid ten-passenger bus, entered by the Indianapolis Motor Car Co., and driven by Frank Grogan, who went through the spring run with a perfect score. While the bus was above the price limit, it was scheduled on class C time and reached French Lick 32 minutes ahead of the schedule. The only penalty assessed against it was 4 points for two loose lamps. The bus was in the charge of T. P. Myers, sales manager of the Rapid Motor Vehicle Co., and Paul Smith and W. C. Bryan, of the Indianapolis Motor Car Co. It carried its full quota of ten passengers, including the observer, and had no trouble whatever during the run in climbing the hills or making the time.

Each of the passengers was dressed as a convict, through a clever idea on the part of Myers. White overclothes were striped with black paint and a cap, similarly decorated, added to the carrying out of the idea. In all of the small towns and cities the bus crowd was the hit of the day. A roar of laughter was created when the party marched up the steps of the French Lick Sprigs hotel in lock-step, wearing their "convict" clothing.

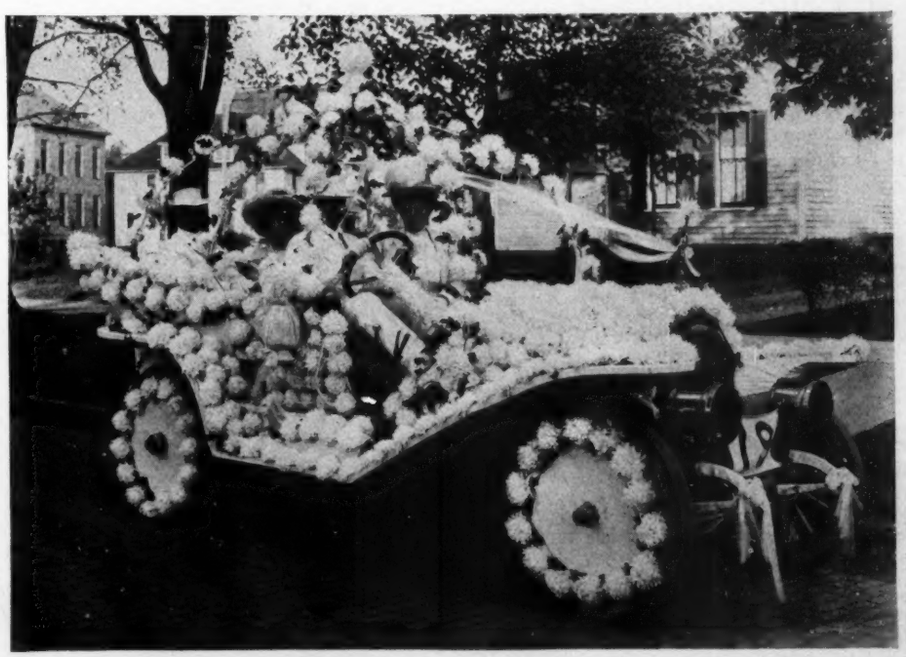


RAPID BUS, WITH PASSENGERS DRESSED AS CONVICTS, IN INDIANAPOLILS RUN

The rules governing the run were very similar to those used in the recent Glidden tour. An observer accompanied each car, the observers being changed each day. The cars were sealed so that to get to the working parts required the breaking of the seals. Penalties were imposed for breaking seals and for each minute's time at work.

TOLEDO HAS BIG PARADE

Toledo, O., Oct. 3—One of the most gorgeous spectacles ever witnessed in Toledo, was the motor car parade last Wednesday night, under the auspices of the Toledo Retail Merchants' Association, which is this week conducting a fall exhibit. One hundred and thirty-one cars were in line, all gorgeously and ingeniously decorated for the occasion. The first prize of $100 was awarded to Ed C. Herron's Stoddard-Dayton, which comprised a picture in white. It was a mass of white chrysanthemums, in the midst of which sat the occupants of the car dressed in white. The second prize of $50 was awarded to Fred J. Finlay, in a Stearns, which was decorated as a battleship, the lines of the ship being worked out in flowers and electric lights. Salutes were fired from a gun.



STODDARD-DAYTON OF E. C. HERRON, FIRST PRIZE WINNER IN TOLEDO PARADE

FOUR-INCH RACE VICTORY FOR THE BRITISH

LONDON, Sept. 24—The "4-inch" race, run off on the Isle of Man course today, was won by Watson in a Hutton car—a product of the Napier factory. Second and third places were taken by Darracqs, driven respectively by Lee Guiness and George. The three leaders all finished within 5 minutes. This race was the fourth of the Tourist trophy contests and is also, in all probability, the last road racing event to be held in the United Kingdom. Its name was derived from the fact that the cylinder bore was limited to 4 inches for a four-cylinder engine, and all the competing cars, save a touring Rover entered by its owner, have their cylinders bored out to the limit.

As might be expected, there was big variation in the lengths of stroke adopted; the smallest, 4¾ inches, being found on the Calthorpes, while the longest known stroke is the 7⅛ inches of the Darracqs. The reason for uncertainty in this last respect was that the stroke of the winning Hutton was not publicly known, but it is said to be between 7 and 8 inches. Curiously enough, the winning car was not considered to stand as good a chance as its two stable companions, which had several special features not found on Watson's mount.

The winner's time was 6 hours 43 minutes 5 seconds for the 340 miles, an average of 50¼ miles per hour. This may seem disappointingly low in view of the fact that some of the cars, and particularly the Huttons, had shown themselves capable of almost 90 miles per hour on a straight run, but it must be remembered that the Isle of Man circuit is not at all adapted for fast work and that its 38 miles includes 10 miles of climbing, 4 miles of which averages 1 in 10.

The weather today was as good as could be desired, and the recent rains effectually laid all dust. Of the forty cars originally entered, the two special Rovers could not be completed in time, and the better of the two Thornycrofts was smashed up at Ramsey late last night. The two Berliets failed to materialize this morning, and hence but thirty-five cars faced the starter at Willaston at 9 o'clock. Of these cars, fifteen were foreign-built and the remainder British. No American car was entered; in fact, the sole American entries in all four races were the two Whites which ran in the 1905 event.

Forty-five minutes after the start Watson came past, followed closely by the Arrol-Johnston, driven by Roberts, and Guiness' Darracq, the order of starting being maintained. The fastest time for this lap was made by George, whose Darracq averaged just 50 miles an hour. Subsequent laps showed an all-round increase of speed and the winner's average for the whole distance showed better than the fastest performance for lap one.

Of the unfortunates, Stirling quickly ran his Hutton into a wall at Ballacraine, luckily without personal injury; and in similar manner the Picard Pictet tried conclusions with the Quarter bridge. Fortunately this car was, like the majority of its fellow competitors, fitted with Rudge-Whitworth detachable wire wheels, and by fitting two new wheels and repairing a front spring, it was soon on the road again and in the race.

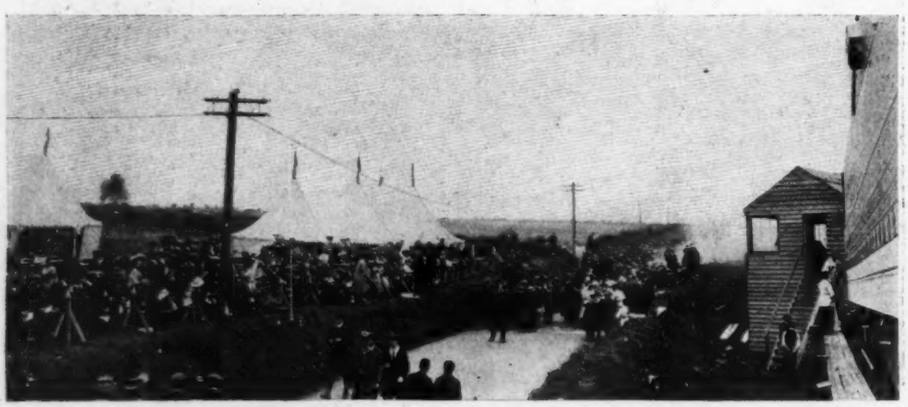
At the end of the second and third rounds Watson still held his own, but on the fourth lap both the Arrol-Johnston and George's Darracq finally managed to pass him after so long a struggle. The other two Arrol-Johnstons had both dropped out, one through engine trouble, and the second, driven by Resta, with a seized-up clutch. Warwick Wright's Metallurgique was also withdrawn. The end of the fifth lap showed that Watson had dropped back again to fourth place, Tuck's Beeston Humber taking third position. Seeing how matters stood, the Liverpool man did his utmost, and at the end of the sixth circuit had run back to second place, coming between Guiness and George in the so-consistent Darracqs.

Meanwhile the list of troubles had increased. Lewis' Deasy broke its crankshaft, but a new one was refitted on the road—though surely a crankshaft is rather an unusual "spare" to carry in a race. The de Dion made rather a bad début, and a seized-up clutch caused Stocks to give up at Ramsey. Both Beeston Humbers also dropped out after having been in the first six all the time.

At the commencement of the eighth lap Watson led, with the two Darracqs not ½ minute behind. These three cars continually passed and repassed until, as the final round was commenced, it was seen, with great excitement, that George was 2 minutes ahead of Watson, who, in turn, had 2 minutes' advantage over Guiness. At 3:44 a car was signaled and quickly Watson drew up at the finishing line—not yet certain of victory. The minutes passed and Guiness' Darracq arived, nearly 5 minutes behind Watson. George was still absent when the elapsed time had run out and Watson was declared the winner. Just as the result was posted up the missing Darracq roared up, taking second place, 2 minutes behind the winning car. It appears that at Glen Helen George found his carbureter on fire, and 6 valuable minutes was lost in repairing the damage done.

Although record time was made from this point to the finish, it was impossible for the Darracq to win back so much, and so, for a fourth time, a British car was victorious in the Tourist trophy race. The fourth to finish was the Calthorpe, driven by Porter—the lowest-powered car in the race—at an average of 46 miles an hour. The only others to complete before the time limit were the second Thornycroft and the Vinot.

Two interesting races were on the program for yesterday: the contest for the Henry Edmunds trophy over a 4-mile climb up Snaefell, and the Graphic trophy straightaway race of 5 miles near Foxdale. Both of these events were open to standard touring cars of power not exceeding 40 horsepower by R. A. C. rating, but only four entries were received for each race, S. F. Edge putting up two Napiers and O. Cupper backing two Metallurgiques. As no further entries were forthcoming the R. A. C. decided to cancel the two events.



General View of Start of British Race

ROYAL ON ITS FEET

Cleveland, O., Oct. 6—After months of effort by a committee of creditors, the Royal Motor Car Co., of this city, which went into the hands of a receiver last fall has been reorganized, and it is announced that manufacturing and marketing the concern's product will again be carried on in a vigorous and aggressive manner. It is understood that the assets of the company have been largely preserved and the organization and good will held together. The reorganized company will start out with large and practically unencumbered resources, with adequate working capital and substantially no current liabilities. The first cars of a new model are now being finished, and within a short

while, it is announced, they will be ready for the inspection of the public. The first of the new models to be turned out will be a four-cylinder 53-horsepower touring car, very similar in general construction to the well known model G, the car on the market at the time of the failure last fall. The Royal people also have been working upon a six-cylinder of about the same horsepower, and have even built and assembled such a car, but this model will not be put upon the market this fall, it is said. It is also announced that in the main, the agencies which before the crash carried the Royal are willing to push the car again. A business-like and even generous attitude on the part of the majority of the creditors was what made possible this reorganization. The creditors' committee which had in charge this work consisted of Charles E. Adams, Cleveland Hardware Co.; B. W. Browne, Great Western Oil Co.; William H. Foote, Wyman-Gordon Co.; H. S. Black, Ohio Brass Co.; H. E. Audrey, Diamond Rubber Co.; S. F. Haserot and Hal H. Hill, all of this city with the exception of Mr. Audrey.

NORTHERN JOINS E.-M.-F.

Detroit, Mich., Oct. 4—The activities of 2 years ago, interrupted a bit by the shifting financial situation but persevering again in the light of subsequent conditions are now featuring the campaign which is being waged all along the line of the motor car industry in Detroit. Never before in the history of the industry have the large factories been so busy as they are at present, turning out the models for next year. All the large plants are now working a full force of men and last week the Cadillac made an announcement that a night shift would be put on as soon as it could be organized. This means the employment of 1,600 mechanics and laborers and it is doubtful if there is a workman of that type to be had in the city now out of employment. The Packard, Ford and Chalmers-Detroit are seething hives of industry and the new E.-M.-F. has both the Wayne and Northern factories filled with men at work on the 1909 models. The formal and final arrangements of this amalgamation were made public Friday in the signing of the papers by which the Northern entered the combine. The announcement immediately followed that the old Northern factory would be fitted up to take care of all the repair and replacement work on the Wayne, Northern and E.-M.-F. cars. The Port Huron factory of the Northern will be devoted to the production of axles for the new E.-M.-F., the main headquarters of the new company and the principal manufacturing establishment will be located at the large factory formerly occupied by the Wayne and this is now being enlarged to meet the demand to be made upon it. A new feature will be a retail garage in this city.

HUB TEST DEAD HEAT

Franklin, Studebaker and Shawmut Unable To Break Tie in Boston 24-Hour Reliability

Boston, Mass., Oct. 2—Unable to pick a winner after repeated attempts the entrants and the touring committee of the Bay State A. A. decided today to call off the run and award certificates to the Studebaker, Franklin and Shawmut cars. These three cars survived the grueling test day after day and night after night without a penalty and were apparently in as fine shape when they finished the last try to eliminate them as when they began their task a week ago. Some plan will be evolved whereby each of the three entrants will receive a tropy of equal value instead of one worth $200, which was to be given the winner.

When the cars checked in at the finish of the last trip to Portland and return the machines had covered 1,607 miles. Some idea of the strenuousity of the test may be gleaned when it is compared with the Glidden tour. In that event the cars covered but little more in 2 weeks than did these three cars in 1 week. What is more the Bay Staters were run night and day regardless of weather conditions and the rules were harder, for nothing could be done to a car even in the way of tightening a bolt. On the night the cars were sent on the run-off there was such a thick fog along the roads that railroads and street cars were tied up or delayed but the motorists pushed on up through to the mountains.

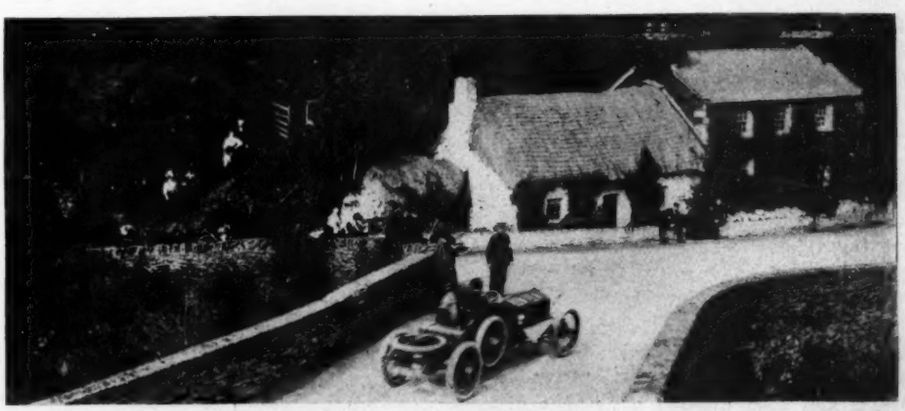
Originally twenty-one cars started, but all but nine went down on the first trial. Seven of these started on the first run-off and three were eliminated. The third run cut out another, leaving the battle then to the Studebaker, Franklin and Shawmut. This trio spent 3 more days trying to beat each other out but without success, and they probably would be going yet but for the fact that the committee was stumped to find runs which would put the cars down and out. It was becoming a physical endurance run for the men as much as a test of cars, too, and this had to be considered. When it was decided to call the run off everyone seemed to feel relieved, and so the endurance test, originally scheduled to go but 24 hours and cover about 380 miles, will go down in motor history as one of the best ever conducted to prove the motor cars of today can be considered perfected machines.

The drivers of the cars deserve much credit for sticking to their tasks day and night. Walter G. Jones drove the Studebaker and with him on every trip went R. W. Daniels, manager of the Boston branch. Jones drove a Studebaker in the last Glidden tour with much credit. C. S. Carris drove the Franklin the greater part of the time, being relieved by Mr. Burns occasionally. Carris had experience in transcontinental runs which stood him in good stead on this trip. Harold Church and C. Ayre took turns driving the Shawmut. They have driven much about Boston but not in any big competitions.

The touring committee that had charge of the run comprised V. A. Charles of the Rambler, E. A. Gilmore of the Thomas, H. G. Kemp and J. C. Kerrison. Harry Knights of the A. A. A. racing board, who was a competitor the first day but was penalized, stepped into the breach when the committeemen were all in after the first day's run, and he conducted the run-off to the mountains successfully while the other officials were getting some much needed sleep.

THOMAS CRACKS A RECORD

Philadelphia, Pa., Oct. 6—George Salzman in a Thomas Flyer light six went after S. D. Waldon's record of 14 hours 1 minute between Pittsburg and Philadelphia and succeeded in making 309½ miles between the two points in 13 hours 52 minutes, including stops, or 11 hours 37 minutes actual running time. Salzman claims he covered 7½ miles more than did Waldon. He figures he lost 2 hours 33 minutes stopping for gasoline, misdirection, toll gates and tire trouble. He claims no repairs were made to the car and that for the last 76 miles he ran through a fog.



THORNYCROFT CROSSING BALLIG BRIDGE IN "4-INCH" RACE

READY ON PARKWAY

More Than Forty Cars Will Compete in Long Island Sweepstakes on Great Speedway

New York, Oct. 7—The Long Island motor parkway has been completed, the state roads which are to be used in conjunction with it, to form the 1908 Vanderbilt circuit, have been thoroughly oiled and rolled, and more than forty entries for the big sweepstakes race which opens the Vanderbilt circuit Saturday are in hand. There are 9 miles of this cement parkway, 22 feet wide at the narrowest point, with many picturesque symmetrical curves and eighteen cement and steel bridges crossing intersecting highways. The bridges and curves are so graded and banked that the racing cars may dash at them without any slackening of speed.

In the construction of this parkway, which is built of Nassam paving, 200,000 cubic yards of grading has been necessary in order to get the desired result. In the 9 miles of straight stretches, curves and bridges, the contractors have used 7,000 cubic yards of concrete, 20,000 cubic yards of paving, 9 miles of wire netting to bind the road bed together, 30,000 barrels of cement, 34,000 tons of stone from the Hudson valley and in order to fence this in on both sides it has required 22 miles of steel wire fencing, 5 feet high and held by cedar posts set at intervals of 15 feet. The grand stand which seats about 5,000 persons has been completed and the entire parkway is fenced in so that it is now impossible to enter it except through one of the three toll lodges which have been established at Meadow Brook, Massapequa and Bethpage. The Meadow Brook lodge, which is situated at the eastern entrance is reached by the old Westbury road which intersects the Jericho turnpike about 3 miles east of Krug's corners. From the intersection of the old Westbury road and the Old Country road, which leads directly to the parkway from the Garden City hotel a new dirt road 22 feet wide has been built at the expense of the motor parkway corporation. This new road winds south from the intersection of the old Westbury and old Country roads across the Hempstead plains and terminates at the Meadow Brook lodge. The lodge is slightly northeast from the famous Meadow Brook Hunt Club.

From the Meadow Brook lodge the general direction of the parkway is east, practically paralleling the old country road and the Hempstead branch of the Long Island railroad. The grand stand is midway between the Meadow Brook lodge and the Massapequa lodge. The other lodge is about 4 miles east of Massapequa, and at this point the racing cars will leave the cement and turn through a new-cut dirt curve which joins what is known as the Round Swamp road. Traveling almost due north along the Round Swamp and Plain View roads the racers will have a very fast but somewhat narrow stretch to travel with a few slight grades and several winding curves. There are no sharp corners until they reach the intersection of the Woodbury turnpike and the Jericho turnpike, where there is an abrupt right angle turn on to the Jericho. A stretch of about ¾ mile east of the 1906 grand stand site has been rebuilt and the going will be fast between Jericho corners and the old Westbury road, where there is another sharp turn leading south to the beginning of the parkway at this section of the course.

The sweepstakes will start at 9 o'clock. All of the cars in the sweepstakes will start together or within 30 seconds of each other regardless of the classes in which they are entered. The smaller ones will run 100 miles; the next class 150 miles; the third 200 miles; the fourth 225 miles, and the high-powered high-priced cars will run ten laps, or 250 miles. The entries are as follows:

Motor Parkway Sweepstakes, cars selling $4,001 and over — Chadwick, Willie Haupt; Isotta, Herbert Lytle; Simplex, Lescault; Hotchkiss, no driver named; Knox, Basle; Renault, Lewis Strang.

Meadow Brook Sweepstakes, cars selling $3,001 to $4,000—Garford, C. Doty; Allen Kingston, no driver named; Knox, Bourque; Rainier, L. A. Disbrow; Rainier, Peterson; Buick, Burman.

Garden City Sweepstakes, cars selling $2,001 to $3,000—Moon, Davis; Lancia, Hilliard; Palmer & Singer, no driver named; Stoddard-Dayton, Miller; Stoddard-Dayton, Wright; Stoddard-Dayton, Tuttle; Pennsylvania, no driver named; Pennsylvania, no driver named; Chalmers-Detroit Forty, Lorimer; Sharp-Arrow, Sharp.

Jericho Sweepstakes, cars selling for $1,001 to $2,000—Chalmers-Detroit, Burn; Mitchell, Mitchell, Maxwell, Selden, no drivers named.

Nassau Sweepstakes, cars selling $1,000 and under — Mitchell, Virbies; Mitchell, Olney; Gyroscope, Buick, Buick, no drivers named; Cameron, Cameron; Cadillac, Warnstaldt.

THREE CUPS FOR BUICK

Madison, Wis., Oct 7—The Buick stood supreme in the first annual race meet of the Madison Automobile League, held in connection with the Dane county fair on September 30. The Hokanson Automobile Co.'s Buick entries pulled down three cups and a cash prize of $25. The Ford took two cups and the Cadillac one. The success of the meet, which was especially evident because it was conducted by an organization formed but a week before, has determined it an annual feature. It was the first real meet ever conducted in the Wisconsin capital. Summary:

Quarter mile, open to any gasoline stock car; standing start, engine dead at ¾-mile post, full stop under wire—Ford, Louis Schoelkopf, won; Buick, Emil Hokanson, second. Time, :30 4-5.

Five-mile dash, free for all stripped, stock gears, listed at $1,250 or under—Buick, Hokanson, won; Buick, Brazee, second. Time, 7:34½.

One-mile novelty slow race—Senator J. H. Stondall, Cadillac, won. Time, 13:00.

One-mile, four-stop novelty, open to gasoline stock touring cars, five passenger—Buick, W. Prellpp, won; Rambler, Melaas, second; Welch, Dr. Welch, third. Time, 3:04½.

Three-mile, open to 2-cylinder stock cars—Buick, Rudolph Hokanson, won; Buick, Emil Hokanson, second. Time, 4:03.

Free-for-all, 5 miles, flying start — Buick roadster, N. H. Falk, Dewett Baskerville driver, won; Buick, E. Hokanson, second.

PARK RACE LIST FULL

Limit of Sixteen Entries For Philadelphia's Founders' Week Event Saturday Reached

Philadelphia, Pa., Oct. 5—With a maximum limit of sixteen entries placed upon it by the A. A. A. officials, the 200-mile founders' week stock car race of the Quaker City Motor Club, on Saturday next, in Fairmount park, filled last Monday, leaving half a dozen disappointed prospective entrants who were awaiting advices from their respective factories before handing over their entrance fees. For the first time in the history of the sport in this country foreign cars were barred, the Q. C. M. C. contest committee announcing the event as an out and out "American" stock car race.

Early this morning nearly all the cars were trying out the 7.8-mile course, permission having been granted the contestants to speed their cars for a couple of hours each morning this week until Saturday, the day of the race. All last week the drivers of the Studebaker, Maxwell, Peerless, Welch, Palmer & Singer, Apperson, Locomobile, Pennsylvania and Pullman have been studying the course leisurely. The Loco people here had been hoping that Joe Tracey would be able to come on to drive their other entry, but as Tracey wired he would be busy on the Long Island parkway that day, George Robertson was substituted.

The prize list, already a lengthy one, is still growing and at this writing it would seem that almost every car finishing would get something. Besides the Q. C. M. C., MacDonald & Campbell and Bailey cups, there will be similar prizes hung up by the municipality and several of the local papers.

All the details for policing the course have been settled, and the papers have been daily ding-donging the slogan "Keep off the course" into their readers. Fifteen hundred of the city's "finest," supplemented by three-score flagmen and miles of rope and wire will insure a clear course, notwithstanding its comparative shortness and propinquity to a busy city of a million and a half of souls who have been laying plans to see this race, even if they are compelled to sacrifice some other feature of the long and interesting founders' week program.

The entrants' camp and the various tire headquarters will be strung along Belmont avenue, near the filter station. Inquiry along the row yesterday developed the fact that there will be but one departure from the unusual use of demountable rims by the contestants. That will be the Chadwick, driven by Jack Harkins, which will be shod with Diamond clinchers with double the usual number of lugs. Besides the Chadwick three other

cars—Peerless, Studebaker and Apperson—will be equipped with Diamonds. The two Locomobiles will have Firestones, the Lozier pair Continentals; American Locomotive and Welch, Fisks; Maxwell, Ajax and Stoddard-Dayton, Goodrich. The others could not be definitely ascertained.

The course has been undergoing such a rolling, scraping and oiling during the past week that it is now lightning fast. The 3-mile stretch along the West River drive, the worst part of the whole course, has been made the fastest portion of the circuit. Daily doses of oil have improved several other soft and dusty places. The two blocks of city streets at Fifty-second and Parkside avenue have been ironed out, several "dips" leveled off and rolled, until, after an inspection by the officials this morning, the entire course has been pronounced "fit."

In the event of accident Dr. R. H. Owen, chief surgeon of the city, says he is well prepared. He has organized an emergency corps of twenty-five surgeons, with fourteen ambulances and eight patrol wagons, which will be stationed at different points around the circuit.

FRANCE SEEKS RACE COURSE

Paris, Sept. 25—France has been considering the advisability of a permanent racing course for 3 years, and is still considering. At the present moment the Auvergne track has fallen back a little in popular estimation, for it has been discovered that the ideal spot is in the Chateau country, by the banks of the limpid Vienne river, near Tours, and in the neighborhood of such architectural monuments as Azay-le-Rideau and Chenonceau. The proposed course has been visited by a commission of the Automobile Club of France and pronounced to be all that can be desired. Geographically the situation is excellent, the course being in the Garden of France, in a land of good roads, and with adequate railroad facilities. After running along the banks of the Vienne, the proposed course skirts the Ruchard camp and the Chinon forest, giving a total distance of 12 to 18 miles as desired, without any railroad or cross-road. The land being on a low hillside, the course would have gentle grades with absolute straightaways of 4 to 5 miles.

BLAZES A NEW TRAIL

Maxwell, Sent After Minneapolis-Chicago Record, Finds Tough Going in Wisconsin

Chicago, Oct. 7—A trail-blazing trip from Minneapolis to Chicago was taken in a 28-horsepower five-passenger Maxwell touring car last week by T. F. Smith, manager of the Chicago Maxwell branch; Al Rentner, a Maxwell racing driver; I. F. Alofsin and R. E. Tucker, newspaper men, with a view of ascertaining the road conditions and also to establish a record between the two cities. The run was started from the West hotel in Minneapolis at midnight Wednesday with the hood of the car sealed by Dr. C. E. Dutton, chairman of the tours and contests committee of the Minneapolis Automobile Club. Normally the car weighs 1,900 pounds but equipped as it was for the rnu it tipped the scales at 3,600, which included the weight of the passengers and the extra part equipment. From Minneapolis to St. Paul, to Stillwater and thence to Hudson the roads were in good shape, the hills being negotiated at good speed. After leaving Hudson, however, the Wisconsin "gumbo" appeared and then the troubles of the tourists began. Through Chippewa Falls, Eau Claire and Abbotsford the roads were in terrible shape, recent rains having loosened up the surface and foundation, if such it could be called, and for a stretch of 95 miles the little car ran in this slippery, soggy stuff clear up to the hubs. This was the most severe test to which the car was put on the trip.

At 3:30 Thursday afternoon a defective cone in the right front wheel demanded attention and then the trip was resumed. Stevens Point, 227 miles from Minneapolis, was reached at 6:50 Thursday evening, where a short stay was made for gasoline and oil. Oshkosh was reached at 1:15 Friday morning, after a terribly cold ride under most adverse road conditions. Two crews were made of the party, one man driving and the other sitting with him talking to him and keeping him awake. The others were in the tonneau snatching what sleep they could and trying to keep warm. Changes would be made when those in front went asleep.

Milwaukee was reached at 10:45 a. m., after the party had been lost leaving Fond du Lac. The road directions were to follow the telephone poles but these branched and the party drove for nearly 80 miles to no purpose. From Milwaukee to Chicago the roads were in good shape and in attempting to make time a shackle on the front spring broke, letting the spring down. Temporary repairs were made and a puncture fixed and the party drew up at the New Southern hotel at 5:40 p. m. Friday afternoon after a continuous drive of 42 hours in the car. The actual running time was about 30 hours, taking out time for meals and repairs. The old record was 3 days.

The trip demonstrated in a concrete way the necessity for lots of road work between Hudson, Wis., and Milwaukee. If anything that could be called a road was built between these points, the run from the Twin Cities to Chicago would become a most popular one and could be made with 1 night on the road very comfortably. Everywhere praise was heard for the performance of the Maxwell car. Its work in the mud was most remarkable and on the hills it showed wonderful pulling power. Sand 5 and 6 inches deep was nothing for it to conquer and it stood the terrible strain in fine shape. At Chicago the log of the observer from Minneapolis was signed by a representative of the Chicago club and examination made of the seals on the hood, which were still intact.

STRICT RULES FOR TEST

Cleveland, O., October 6—The rules for the Cleveland Automobile Club's reliability contest scheduled for October 14, 15 and 16 have been creating a small sensation among local dealers and agents because of their strictness, Chicago Motor Club rules being used. In the recent Toledo contest all that cars were penalized for at the end of the run was broken springs and bent axles. In the Cleveland event, the machines are to be gone over at the end of the contest with a fine-tooth comb and every little defective part will be ferreted out. Tires and accessories are in a separate class, and the points charged against them will have absolutely no bearing upon the score of the car itself. There is to be a regular tire contest, for which a trophy will be offered. The winner of this trophy will be determined by computing the average penalization per tire of each make, that tire with the least average penalty being the winner. At least eight tires of one make must compete in order to be eligible for the tire trophy, and at least 50 per cent of the competing tires must be carried on the rear wheels. Speedometers, odometers, clocks, lamps, etc., will be treated separately, and the points charged against them will in nowise affect the score of the car at the finish of the run.

SIXTEEN CARS ENTERED IN FOUNDERS' WEEK STOCK CHASSIS RACE

Name of car	H.P.	No. Cyl.	Cyl. bore	Stroke	Entrant	Driver
American Locomotive	54.1	6	4¾	5½	L. J. Bergdoll	L. J. Bergdoll
Maxwell	28.9	4	4¼	4¼	Maxwell-Briscoe Co.	H. Bitner
Stoddard-Dayton	36.1	4	4⅝	5	Hamilton Auto. Co.	E. C. Ireland
Peerless	38	4	4⅞	5½	P. T. du Pont	A. C. Maucher
Palmer & Singer	54.1	6	4¾	5½	C. A. Schroeder	William Wallace
Apperson	48.4	4	5½	5	Philadelphia Auto. Co.	George E. Davis
Welch	51.3	6	4⅝	5	E. R. Bergdoll	E. R. Bergdoll
Studebaker	36.1	4	4⅝	5¼	Studebaker Bros. Co.	Frank Yerger
Locomobile	40	4	5	6	I. J. Morse	G. Robertson
Locomobile	40	4	5	6	I. J. Morse	J. W. Florida
Acme	51.3	6	4⅝	5	Acme Motor Co.	Cyrus Patchke
Chadwick	60	6	5	6	J. M. Munyon, Jr.	Jack Harkins
Pennsylvania	36.1	4	4⅝	5¼	Penna. Auto. Motor Co.	Len Zengle
Lozier	44.1	4	5¼	5¼	Herman Brill	Ralph Mulford
Lozier	51.3	6	4⅝	5½	W. P. Herbert	Harry Michener
Pullman	39	4	4 15-16	5¼	York Motor Car Co.	Roy Staines

RATING HORSEPOWER IN MOTOR CAR MOTORS

FOR a given horsepower, the motor in which the torque is a maximum should prove the most attractive, for reasons as follows:

1—It will then be the more difficult to "stall" the motor.

2—The motor will run slower without "laboring."

3—The motor will start with a greater load at a slower speed.

4—The motor will be more capable of extracting the car out of high resistance portions of the roadways.

Torque is the product of piston area times mean effective pressure; horsepower is the product of torque and speed. It is plain then that piston area is of the greatest importance under such conditions, and even if the stroke is short, the torque will not diminish until the speed is quite high, whereas, the advantages enumerated are all with the lower range of speeds where the effect of diminishing torque will not be noticed.

As between a short stroke motor with a considerable piston area and a long stroke motor with a diminished piston area, the short stroke motor is the superior of the two in motor car work from these points of view, at any rate. From the same power, the short stroke motor must be of the greatest piston diameter, hence of the maximum torque, at the lower speed range. If the bore of the short stroke motor is greater for a given power, then the valves can be of greater area and the mixture losses will be a minimum.

The result is, all things considered, that the long stroke motor shows its advantages only where the bore is the same for both, and the author is not in a position to make the k values in his formula differ, in view of a difference in stroke, on a basis as shown in the curve Fig. 1—Part II—since designers are not compelled to accept the conditions there set down, the same bore for both the long and the short stroke motors, considering a given horsepower rating. One point more; torque is not limited by speed, as we are accustomed to regard it, unintentionally perhaps, although the torque does diminish as the speed increases. It is the tortuous passages and the obstruction offered by the valves that does more to suppress the torque than any other influence. Were the valves of the same area as the pistons, and the manifolds so short and straight as to offer no appreciable resistance to the flow of the gases, the torque would remain nearly constant at all speeds. On the other hand, the motor car that makes the least noise, that is the most desirable. If the valves are quite large, have strong springs, and the compression is good, speed and noise are then companions. Noise, in itself, is rather a bad phenomenon, for the very good reason that the mechanical losses in machinery are indicated by heat and noise.

EDITOR'S NOTE—Part III of paper prepared Thomas J. Fay, president Society of Automobile Engineers.

There is a limit to the sizes of the valves then, hence the torque will fall off at the higher speeds, not because of the speed *per se*, but for reasons incident to the construction of the valves. On the other hand, there are limits of speed, one of which is the diminishing torque, another being the ills of the inertia component. Were it possible to so design a motor as to eliminate the weight of the moving parts, there would be no limit to the speed on that account. The speed would still be limited, however, by the falling torque, due to the inability of the explosive mixture to follow quickly receding pistons. The largest valve diameter found in practice is one-half the diameter of the piston, while the smallest equal one-fourth the piston diameter. This is a vast difference in practice, if we but take into account the fact that the area varies as the square of the diameter.

If a valve lifts the equivalent of one-fourth of its own diameter—flat seat—the area of the opening will be approximately equal to the area of the valve, while if the valve is half the piston diameter its area will be equal to one-fourth the piston area. But valves do not lift the equivalent of their own diameter, nor are most of them flat-seated. The actual lift is seldom more than one-third inch, at the most. The larger the valves, the more the lift is diminished to obviate noise, so it would seem the available space through which the mixture must "sift" is but small indeed. Fortunately, the mixture is under pressure, or impelled by a vacuum, which amounts to the same thing. The exhaust is under pressure—terminal pressure—and in the four-cycle motor the piston sweeps the gases out. These are matters that influence the torque, hence the horsepower rating, and, it is more to the point to give them close attention than it is to browse over formulæ, with a view to predicting the probable commercial rating of a motor; it is the motor that must deliver the power rather than the formula. The time the valves are open is also of the greatest importance, no less than the relations of opening and closing to the travel of the piston. If the valves are small in proportion, and the lift limited, to afford the best possible results, the time of actual opening is the only remaining loophole through which the designer can mount to success. An inlet valve, for illustration, should open at the beginning of the suction stroke, and should remain open until the piston compresses the mixture sufficiently to render the sum of the opposing pressures equal to zero. On the other hand, the exhaust valve should open toward the end of the expansion stroke—not at the end—at the point where to be rid of the exhaust gases is of greater importance than the balance of the work represented by the terminal pressure. The exhaust valve should stay open as long as possible, which is up to the time of the opening of the inlet valve.

Few, indeed, are the motors in which this question is so thoroughly disposed of as to require no further attention. The timing of the spark is also open to investigation. As the speed increases, the spark must be advanced, else the propagation of the flame will be ill-timed, the mean effective pressure will be lowered, and the power of the motor will be reduced, as indicated by a falling off of the torque.

Fig. 3 shows the phenomenon due to late spark, in which it will be observed the pressure not only fell off, but the flame propagation was delayed. This decreases the power, in that the torque will be much diminished. When this condition obtains in a motor it is persistent and, as a rule, due to defective equipment, so that the operator is rarely able to so "tune up" as to eliminate the defect; the sparking equipment is more likely not what it ought to be.

There are two conditions to be satisfied as respects the motor in conjunction with the car. The motor must be equal to the occasion when the car is running at its maximum speed, and it must have sufficient flexibility to enable the operator to run the car at speeds below the maximum. Involving the maximum speed, the gear ratio must be that which will end in a zero equation, if the power of the motor is indicated, plus the resistance of the car. This is not always so, and the result is the motor is not allowed to do as well as it really could under more favorable conditions.

If the — horsepower of the car equals the + horsepower of the motor, the gear ratio will be the ratio of the crankshaft to the driven wheels of the car when the car is moving as fast as it can impelled by the motor delivering its highest power. Taking this as a statement of fact, it is easy enough to devise a formula to satisfy the conditions of a zero equation. If we

$$\text{say H.P.} = \frac{2\pi R' S \cdot \frac{88}{M} \cdot \frac{Q}{33{,}000}}{33{,}000} \cdot \frac{\text{H.P.}'}{33{,}000}, \text{ in which:}$$

H. P. = the resistance offered by the car in horsepower.

R′ = the radius of the driven wheel in feet.

S = the speed in revolutions per minute of the driven wheels.

Q = the mechanical efficiency of the transmission system.

M = the speed of the car in miles per hour.

*H.P.′ = in brackets of the formula the horsepower as measured at the contact of the tires and roadbed.

The—plus—horsepower of the motor must equal the requirement as above set down, and for convenience it will be well to distort the same formula, with a view to deriving the horsepower of the motor, thus:

$$+\text{H.P.} = \frac{2\pi \text{ R S P, in which:}}{33{,}000}$$

H. P. = the actual delivered horsepower of the motor.

R = the radius in feet = unity.

S = the angular velocity of the crankshaft in revolutions per minute.

P = torque.

By way of an example, it will be something to set down the known values before arranging them, thus:

$$\frac{33{,}000}{88} = 375$$

Q = 80 per cent; it may be higher or lower in different cars, but the value taken will serve in general.

$2\pi = 6.28$.

R′ = 1.5; R′ depends on the sizes of wheels used on cars; in this case 36-inch wheels will be taken.

S = 560.5 revolutions per minute, for 60 miles per hour.

H. P.′ = 36.

With the known values thus available, it will be an easy matter to insert them in the formula and solve for horsepower thus:

$$\text{H.P.} = \frac{6.28\times1.5\times560\times375\times36}{\frac{.80}{60}} \div 33{,}000 = 45$$

For the motor we would have:

$$+\text{H. P.} = \frac{2\pi \text{ R S P}}{33{,}000} = 45 \text{ horsepower,}$$

in which:

2 = 6.28.

R = unity = 1 foot.

S = 1,120.

$$\text{P} = \frac{45\text{x}33{,}000}{6.28\times1{,}120} = 206.8+$$

The gear ratio would have to be as 560: 1,120, or as 1:2 in order to permit the motor to run at its best speed with the car making 60 miles per hour. Any other gear ratio would defeat the plan, whether up or down, since there would be only one speed at which the motor would deliver its maximum power, which it would have to do to equal horsepower = 45.

The second condition to be satisfied takes into account the flexibility of the motor, in order that the car may run at less than the highest speed the motor is capable of dictating, under conditions of a correct gear ratio. This second condition is rarely, if ever, satisfied in practice, for if it were there would only have to be one set—couple—of gears in the transmission. In practice it is considered the highest attainment if the motor will enable the driver to negotiate all road conditions on the high gear. The maximum flexibility of the motor would then be in evidence and this would be a condition induced by a motor characteristic showing increasing torque with decreasing speed to a high degree.

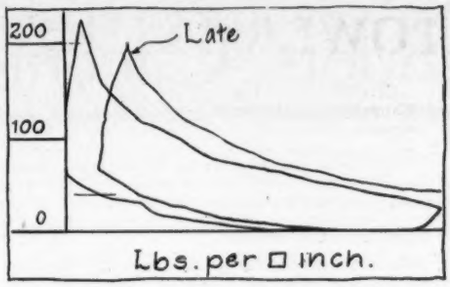


FIG. 3—SHOWING A LATE SPARK RESULTING IN A REDUCTION OF TORQUE AND POWER AS WELL

Here is evidence of the desirability of a motor of maximum bore and minimum stroke. The torque would tend to hold in proportion to the square of the bore and would recede with the speed, after a certain speed is attained. Of course, on the boulevards, flexibility would be assured, irrespective of the shape of the torque curve, since the torque would not be lower at the lower speeds than that of the highest power speed. The car takes power greater than in direct proportion to speed on a given level road, and this fact would assure flexibility on good level roads. It is when it becomes necessary to go slower in bad roads that the higher torque is a necessity and it is the motor with the maximum bore for the power that will be the most likely to favor this road condition.

Thus far it has not been necessary to specifically consider the number of cylinders best suited to the problem. Indeed, it is a fact that the abstract question is independent of the number of cylinders. In practice, however, it has been found that the weight efficiency is influenced by the number of cylinders. It is purely a matter of weight efficiency then that influences the cylinder question, barring the matter of the space available plus style and trade considerations. As a purely engineering proposition, the number of cylinders to use will be the number that will afford the highest weight efficiency, coupled with a practical thermal efficiency. There is no chance of any motor, of any number of cylinders, being superior merely because it has so and so many cylinders. The "I-saw-it-first" idea is not an engineering proposition at all, nor can it have any bearing on the situation.

If a single-cylinder will suffice for the purpose, it is the best to adopt; but if it will not, then to use two cylinders would be the natural sequence. Should the situation demand more than two cylinders, it is to four that one should look, then to six, and finally to eight. With a single cylinder motor must be included a flywheel of a weight capable of completing the cycle, and when the excess of flywheel weight amounts to more than the second cylinder, it is the two-cylinder motor that is wanted. Likewise, as the power requirement is advanced, the conditions naturally indicate more cylinders.

As the number of cylinders increase, the torque impulses are multiplied, and as they spread around the circle, the need of flywheel effect gradually recedes until with enough cylinders the flywheel ceases to be of value, except while the motor is being started, during which time the flywheel serves a useful purpose, since the initial effort, in the absence of any flywheel effect, would be beyond the average motorist. To entirely do away with the flywheel, neglecting the question of cranking, is a matter not worth discussing, because more than eight cylinders would be required, and the author is willing to go on record as responsible for the prediction against the chances of anyone ever wanting a greater number.

The argument in favor of a plurality of cylinders is as simple as can be. A ship will make headway in a steady wind that cannot be made in a series of gusts of wind. It will stand up under all the air that goes to make a hurricane if delivered at a steady rate, but not otherwise. Likewise, the mastery of the energy stored in the fuel is best managed in small increments, multiplying the number of impulses to the maximum, bearing in mind that complicated mechanisms are to be avoided, when possible to do so. It would be vain to jump to the conclusion that this simple way of viewing the matter argues for multiple cylinders at once and for all. The facts are quite opposite. If in a multiple cylinder motor certain sizes of cylinders will serve the purpose well, any less number of cylinders of the same size will serve the purpose equally well if the power requirement is reduced in direct proportion to the reduction in the number of cylinders.

As the number of cylinders is reduced, the flywheel effect must be increased, and the proper guide is the weight efficiency on roads such as America affords; in lands where fuel is high and road making has been advanced it is the thermal efficiency that should remain uppermost in the mind's eye of the designer. It might be said a single cylinder could be so large as to preclude the chance of rendering the motion steady, which would be quite true in the absence of enough flywheel effect to complete the cycle within the limits of "speed fluctuation," called steady, when reference is had to a motor with a plurality of cylinders.

Fig. 3, showing the effect of a late spark, was originally the work of W. Watson, presented in a paper before the Royal Automobile Club of Great Britain, Feb. 21, 1907.

*H. P.′ includes wind resistance. This horsepower, plus the loss in transmission, must equal the horsepower of the motor, as measured by a dynamometer.

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems and invites a discussion of pertinent subjects. Correspondence is solicited from subscribers and others.

ORIGIN OF A. L. A. M. FORMULA

Reading, Pa.—Editor Motor Age—The A. L. A. M. horsepower formula you mention was first used by the Automobile Club of France, so far as I recollect. It was next adopted by the British club and next by the A. L. A. M. I do not know who figured it out, but it was undoubtedly arrived at as was my formula published in the Cycle and Automobile Trade Journal in December, 1903. I simply gathered the speed sizes and horespower of as many engines as I could and so got an average of the piston speeds and powers. Piston speed is the limiting factor of an engine, so I assumed 750 feet as a maximum working speed. With this constant we can drop out of the calculation the stroke and revolutions for the piston speed is the product of these two. We have left, then, to consider, the area of the piston and the pressure, and to reduce these to horsepower. The pressure is assumed to be a constant since we have no other ground for guessing at it. The area of the piston bears a fixed relation to the piston diameter squared. So with all these assumptions, we take the known horsepower and divide D^2 by it, which gives the constant 2.5. We must multiply by the number of cylinders of course, so this calls for N. In this formula the piston speed is assumed to be 1,000 feet per minute, which corresponds very closely to my formula wherein I assumed a speed of 750 feet and a constant 3. Since I published my formula I have learned that some engineers have used a constant 4 in the same way for stationary engines and an assumed piston speed of 600 feet. If I knew this at any time I had forgotten it when I worked out the one I use. I do not use the constant 2.5 much, because I consider it too high. Most of the work on the road is done at speeds far below 1,000 piston feet per minute, and most engines will not give the power indicated by that formula. Racing engines may, but the general public is not interested in racing so much as in general road work, I believe.—Charles E. Duryea.

CAUSE TIRE HEATING

Pomeroy, Ia.—Editor Motor Age—Through the Readers' Clearing House will Motor Age inform me what is the cause of tires heating, whether it is due to the friction on the road, or by the air contained in the inner tubes, and if caused by both has it been determined the degree of heat produced by road friction and that produced by the air in the tubes?—Frank Johnson.

The cause of heating in the fabric and rubber of pneumatic tires is as follows: A cross section of a tire at the top of a wheel, the point farthest from the ground, is circular; a cross section of this same tire, where it bears upon the ground, shows the tread flattened. As the tire rotates and each part approaches the point where it touches the ground, it changes from the circular to the flat and back to the circular. This change is constantly taking place and travels in a circle around the tire, and it is this working of the fabric and rubber from the circular to the flattened shape that creates the heat. The slipping of the surface of the tire on the ground also causes a certain amount of heat. The air in the tube has little to do with it except in that, as the fabric gets hot, the air heats and expands.

ADJUSTING HOLLEY CARBURETER

Leonia, N. J.—Editor Motor Age—I have a two-cylinder car of the type having automatic intake valves. This machine has just been thoroughly overhauled and ran nicely for a time, but recently mis-firing has occurred very often. Mis-firing can be prevented by opening the carbureter needle wide, but under these conditions the engine races when the throttle is in its closed position, and even if the timer is fully retarded. Running the machine for about 5 miles only, even on high gear, heats up the jacket water until it boils violently. If the needle valve of the curbureter be partially closed, the engine will stop entirely if the throttle be thrown open, though running with frequent missing with the throttle closed. This engine never heated badly before and I would like to know the secret of setting the carbureter properly, as I think the trouble lies entirely in the latter. The carbureter is a Holley model A standard.—F. Hopkins.

The method of adjusting the Holley model A carbureter, and which is illustrated herewith, is as follows: After attaching the carbureter to the car and connecting the pipe from the gasoline tank take off the mixing chamber cover to determine if the gasoline level is at the proper height which should be such that the gasoline will not overflow out of the to pof the spraying nozzle. Should it be too high, lower the float B in the float chamber. Should it be too low, raise the float. Once the needle valve C is at the proper height, open the valve one and a half or two turns, open the throttle D partially and start the motor. Immediately open the throttle wide, retard the spark and set the needle valve C at a point where the motor runs the best. This done close the throttle to a position where the motor runs slow enough to suit you and set the horizontal adjusting screw F so that it will allow the throttle to close no further. If at this point the mixture is rich or smokes, the tension on the auxiliary valve is too great and loosen the adjusting screw so that it barely holds the auxiliary air valve in position. With this done set the needle valve again as before and try it. Unless something is very wrong with the ignition or some other part of the motor the results from the carbureter should be very satisfactory. It is not to be expected you will get this adjustment at the start but a little experimenting should make it correct. You will find in adjusting this carbureter there are three parts to be considered; in fact, four; the needle valve C, the throttle D, the auxiliary air valve springs and the float B, and unless the utmost harmony is obtained in all three results will be far from satisfactory. The heating you speak of is undoubtedly the cause of too much gasoline. A scheme followed by a great many drivers in adjusting carbureters with auxiliary air valves is to obtain regulation for slow-speed by the needle valve and for high-speed by the auxiliary air valve and throttle. You will doubtless find that by work along this line, as well as that already suggested, your carbureter difficulties will cease. If not, the best solution is an overhauling of it or the purchasing of a new one.

FISK DEMOUNTABLE RIMS

Chicopee Falls, Mass.—Editor Motor Age—We are under the impression that Mr. Clarke, in his communication relative to quick detachable rims on page 25, Motor Age, issue of September 24, has not examined the Fisk type of rim, in which there is no danger of it coming off the wheel, at the same time permitting of the tire being readily removed. The question of safety is one point in this type of tire, in that it is not held by air pressure on the rims. At the recent Lowell road race change of tires was made on a Knox car in 22 seconds, this car having a Fisk type of rim.—Fisk Rubber Co.

BUYERS OF OLD RUBBER

Columbia, S. C.—Editor Motor Age—Will Motor Age give us the addresses of buyers of old rubber. We, like many others, do a large tire business and operate a vulcanizing plant, accumulate quite a bunch of old casings, inner tube stock and scraps of vulcanizing stock. In most cities of this size the junk dealers are people who buy every known commodity from second-hand railroads to old feathers, and generally give very little for old rubber, and therefore would like the addresses or hear from people who absorb this stuff from the junk dealer, so that we could

deal direct with them.—Rubber Dealer.

At present there is not any concern looking after this waste rubber direct. In Chicago, New York, and other large cities, junk dealers pay from 6 to 8, and sometimes 10 cents per pound for old casings, and upwards of 20 cents per pound for inner tubes. Then, in turn, sell their supplies to a reclaiming company which uses this for the manufacture of such parts as bumpers and other bulk rubber parts of that nature.

ILLINOIS-ALABAMA ROUTE

Salem, Ia.—Editor Motor Age—Will Motor Age give me the best touring route from Chicago, Ill., to Huntsville, Ala.?—W. T. Shriner.

The best route for a trip of this nature would be from Chicago east to South Bend, Ind.; thence south by way of Plymouth, Peru, Kokomo, and Tipton to Indianapolis; continue south through Columbus to Louisville, Ky. From this point on Motor Age cannot vouch for the road conditions, but would suggest a route by way of Frankfort to Nashville, Tenn.; thence through Columbia to the Alabama line and Huntsville. A route from Louisville, Ky., which has been covered, leads through Bardstown, New Haven, Buffalo, Magnolia, Canmer, Uno, Bear Wallow, Cave City, Glasgow Junction, Bowling Green, and Franklin; thence to Nashville, Tenn.; Lavergne, Murfreesboro, Fayetteville; thence direct across the boundary line to Huntsville, Ala. Motor Age is prepared to furnish the necessary road directions from Louisville to Huntsville, as well as from Chicago to Indianapolis, the only portion not covered being Indianapolis to Louisville.

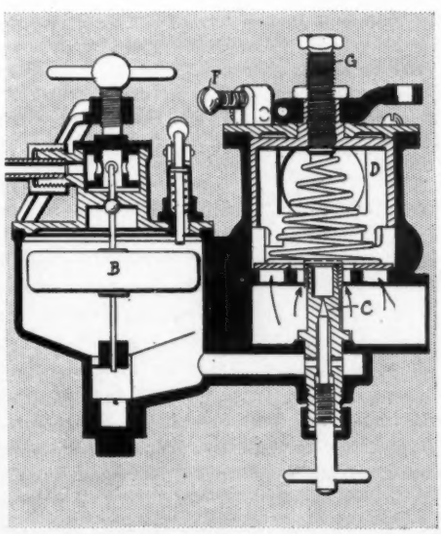
FEEDS TOO MUCH OIL

Chancellor, So. Dak.—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell what causes my double-opposed 20-horsepower motor to overheat, and why I cannot throttle the motor down to less than about 500 revolutions per minute when running idle without missing fire and occasionally popping back into the carbureter? The motor runs well and has good power with the throttle from a quarter to about two-thirds open, but, if I close throttle more than that, the motor misses fire though it does not slow down very much until the throttle is almost entirely closed. The battery is in good condition and I always drive with the spark advanced as far as possible. The compression is good; the one cylinder seems to have just a little stronger compression than the other and the mixture must be about right, because the motor does not smoke and has good power. The water circulation is all right but the water boils after running about 10 or 12 miles. I can do only 8 to 12 miles per gallon of gasoline. Should I get more mileage per gallon, or is this enough? I have tried to use less gasoline but the motor does not run as well and heats quicker. Will too much lubricating oil heat a motor as well as too little oil?—E. C. Hofmeister.

Your motor trouble is due to poor carburation and feeding too much oil to the cylinders. The fact that the motor misses below 500 revolutions indicates too weak a mixture, which can be corrected by an adjustment of the needle valve of the carbureter. The popping back into the carbureter is due to carbonization, the carbon lodging on the intake valve seatings and not permitting the valve to close properly, so that on the explosion stroke the flame passes through the inlet valve into the intake manifold. This carbonization can be overcome by reducing the oil fed to the cylinders, and probably lowering the oil level in the crankcase to a certain extent, this level being determined by removing the top of the crankcase and measuring it. The heating of which you speak is undoubtedly due to the accumulations of carbon which prevent the valves seating properly, which, in turn, allows a part of the mixture to escape on the compression stroke. This escape of the mixture leaves a too low compressed charge which burns slowly, this slow combustion causing the heating. If you cannot adjust the oiler sufficiently you had better secure a new one.

THE HOODOO MACHINE

Ware, Mass.—Editor Motor Age—A few weeks ago I received a letter from a doctor in Springfield, offering me a position for the remainder of the season at good wages. I was out of a job at the time and immediately accepted the offer, showing up at Springfield the following morning. I was introduced to the doctor by a friend and after my references had been examined I was shown into the garage to look over my new charge, a beautiful touring car. I examined the machine thoroughly and feeling quite satisfied was ready to assume my new duties at once. The next morning my employer informed me he intended starting that afternoon with his family for an extended tour of the state. The thought of again speeding over the country roads was to me a pleasing one. We started from the city in the best of spirits, the doctor especially enjoying the new experience, as did his wife and daughter who accompanied him, the doctor remarking that had he known the pleasure of motoring he should have owned a machine long before. As in the case of many new machines, however, the motor car soon started to balk, and, alighting, I soon had it in running order again, but certainly something out of the ordinary was the trouble with the car, for it continued its queer actions all the afternoon, and, in spite of my many attempts to adjust the running gear, I was unable to do so.



HOLLEY MODEL A CARBURETER

As we moved slowly along the road I could see that the doctor, who was a very nervous man, was quite disgusted with the actions of the new car, and looked at me in a way that meant "you don't know your business;" but, as I made allowances for existing circumstances and knowing it was the fault of the machine, I was not offended. Finally, when within a few miles of Worcester, the motor car broke down entirely, and, as it was 11:30 p. m., the doctor was in despair and his family refused to be comforted. While figuring how we could get into Worcester, an electric car came along and the doctor immediately made arrangements with the crew to tow the machine into the city; ropes were secured, and seated within the trolley car we could hear the motor car bumping along behind.

The next morning the doctor decided, after a long conference with his family, to abandon the trip and return to Springfield as soon as the machine could be repaired. About 10 a. m. we started out on the return trip, and as we moved slowly along, I made up my mind that when the present trip was completed I would be looking for another position, as this trip was but a repetition of the other. The motor car moved slowly into Springfield at 7:30 p. m. that evening and was stalled on one of the principal streets, where the doctor was well known, and a large crowd gathered to witness the doctor's discomfuture. By this time my employer was thoroughly disgusted, and by the glare in his eye I knew something unusual was likely to happen. Alighting from the machine he shouted, "Does anyone here want a good motor car free," and, on being answered in the affirmative, replied, "Take it, it's yours," and he and his family quickly left the scene. As for myself, I left Springfield the following morning, without learning who had taken the hoodoo machine, and I am now in the market for another position.—P. H. M.

CHICAGO-MUNCIE ROAD ROUTE

Chicago, Ill.—Editor Motor Age—Will Motor Age give me the best touring route from Chicago to Muncie, Ind.?—H. G.

The best touring route from Chicago to Muncie, Ind., is as follows: Chicago to South Bend by way of Michigan City.

From South Bend to Kokomo, through Lakeville, Lapaz, Plymouth, Argos, Rochester, Perrysburg, Mexico, Peru, Bunker Hill, Miami and Kokomo. Seventeen miles beyond Kokomo, at Tipton, take the cross road to Muncie, the exact nature of which road Motor Age is not aware of at the present time.

STANDARDIZED MEASURMENTS

Kenosha, Wis.—Editor Motor Age—In all the hill-climbing contests which have come under my notice, the engine ratings have been based on the piston displacement, and invariably the volume is expressed in cubic inches. This is one of the mathematical absurdities that have descended through generations and have produced habits hard to break. Always we think of volumes as having rectangular boundary lines and we must convert all forms, however regular and common tney may be, to the cubic form before we can compare them. So, also, we think of surfaces and sections as squares, hence our units of area are always square and we go on converting the value of circles and cylinders and spheres into terms of squares and cubes, for each equation, requiring the use of a long decimal multiplier or divider, wearing out gray matter, better devoted to more useful service.

When we get away from this worship of the rectangular god, we are free to set up a new and more convenient rule for comparing volumes and areas, viz: When volumes or areas of like form are to be compared with each other, the unit of measurement should be of the same form. The electrical people have adopted the "circular mil" as the unit of sectional area for wire, which is much more convenient than a square mil for it requires only that the diameter in .001 inch be multiplied by itself to give the sectional area, and the diameter in .001 inch of a wire of any desired expressed in circular mills, is the square root of the area. D^2 = area is a much shorter equation than D^2 .7854 = area or πR^2 = area for purposes of comparison a much better one. Why should not the engine builders and users adopt the cylindrical inch as the unit of piston displacement and cylinder capacity. Then the equation for displacement would be

$$d^2 L = \text{Volume},$$

the proportion would remain the same as if reduced to cubic inches. Thus the displacement of a cylinder 4-inch diameter with 6-inch stroke = 96 cylindrical inches or 75.3984 cubic inches. The displacement of a 6-inch cylinder with 4-inch stroke = 144 cylindrical inches or 113.0976 cubic inches. Also 96 : 144 :: 75.3984 : 114.0976 you see is just the same, and if you took your choice without prejudice you would take the shorter one expressed in whole numbers. It is as easy to convert the volume of irregular cavities such as the compression space into cylindrical units as cubic units, the ratio between them being, of course, 1 to .7854.

The sectional area and volume of intake and exhaust pipes, the area of any circular opening such as valve ports could best be expressed in circular and cylindrical inches. Simple and easily understood methods of comparing one engine with another would be a boon to the motor car user, who is not always an engineer, neither has he a slide rule with him all the time, but he could readily multiply the diameter by itself and that product by the length of stroke. The calculation usually involves whole numbers or simple fractions and could be done mentally. There should also be a standard of speed at which an engine is rated or rather there should be two points at which a variable speed engine such as used in a motor car should be rated.

Various compressions and valve timing may give an engine a high power at high speeds at the sacrifice of power at low speed and vice versa, so it is hardly fair to compare two engines of the same bore and stroke at only one speed. Hence a rating should be given at a point between 400 and 600 revolutions per minute—the normal running speed—and between 1,200 and 1,600 revolutions per minute—the point of greatest output.

The power curve in most engines rated at from 30 to 50 horsepower is a rising one up to from 1,200 to 1,600 revolutions per minute. At some point in this range, the inertia and other losses which are rapidly rising, compensate any increased power due to speed, the curve flattens out and shortly begins to drop.

Why not establish these extreme points in some engineers' convention as a standard of speed for power rating, publish it widely and thus "put a crimp" in the practice of trading in ambiguities and fairy tales?—Frederick Purdy, Thomas B. Jeffery & Co.

ON ENGLISH BUSINESS METHODS

London, Eng.—Editor Motor Age—English ideas on business matters are often very different to those generally entertained by American manufacturers, as may be gathered from my recent experience in England after an absence of 6 years from America. This length of time has been sufficient to entirely separate me from any remaining insular prejudices which I may have entertained during my previous residence in England and it may prove of some interest to the American reader to hear how things now strike me on my return to the old haunts of youth.

As I was stopping near a pretty large country town in Surrey I looked it over to ascertain what was doing in the motor car line as the town is situated on one of the trunk roads leading from London to Portsmouth and consequently traveled by a large number of motor vehicles of all sorts; with this end in view I called at a factory where they built cars of various sorts, indeed the product ranged from a bicycle to a city bus, this I notice is one of the chief differences between the two countries, while the American devotes himself to one article, arranging matters so as to reduce that article to a standard and perfecting its production till he can sell it for what another can barely buy the materials for, the Englishman tends to cover such a wide range of output that it is impossible to standardize every article or to have sufficient machinery to manufacture in duplicate so that the cost stands high and though the quality is all that can be desired, there is a mere fraction of the business to be done at the prices necessarily charged that there would be if a single article had been specialized. To return to my experiences. The foreman of the works showed me what was doing in the works, where the firm only made the bodies, but he could not give me very much information and referred me to the head offices, which were in the town; on my presenting myself there and stating that I would like to interview the manager with a view to obtaining data which would provide an article interesting to my American friends he sent word that he was not interested in the proposed matter and so excused himself. Now whether this lack of interest was based on modesty or contempt I had no means of judging, but it struck me as being so typical of the attitude of many British tradesmen that I here record it. The idea of a man engaged in the manufacture of an article which he wished to sell to the public being uninterested in bringing that article before the public to which he wished to sell it was so astounding to the American mind that I almost doubt whether my readers will believe me.

I saw enough to demonstrate the great mistake which was being made in trying to cover too large a field and the expense involved by not making use of more machinery; the design of the bodies was such that it would have required an enormous outlay to deal with it in a proper manner, so the whole of the work was done practically by hand, hence the only way of reducing the cost would be by cutting down the wages of the men, whereas if the firm had concentrated on some certain article and equipped the factory specially for that production of it it would have at once secured an enormously larger market, a larger profit and been able to treat its men better.

I notice the same tendency in all the work I have seen up to the present, the design not made with a view to production

in large numbers. When I point out this fault they declare that they can fill all the market there is by the method they employ and cannot be made to see that if they could market the product at say 50 per cent of the present prices they would secure many times the sales. So far as I have been able to hear, things are in a very different state with regard to delivery than I left them in the States, here the agents complain that after giving an order for cars to be delivered in say 3 months the makers write after the lapse of a fortnight asking if they may not make delivery, so crowding the agents. I would here like to give a hint to American manufacturers who are appointing agents in England and who really want to do business. I went into the shop of an agent for one of the most popular low-priced cars made in America which sells for $500 in the States and was surprised to find it being sold here for $925, nearly double; now the cost of shipment is very low and there is no duty to be paid, so I think it was mistaken policy to allow the agent to charge nearly double the price paid in America, indeed at the price he was doing, or trying to do, business there are plenty of at least equally good machines to he had, while at the price which it could, and ought to be sold, there would be practically no competition.

I have seen but very few American machines so far and of these only one or two of this year's pattern, the bulk of them being at least 3 years old. I would warn American manufacturers not to repeat the experience of years ago in respect of American bicycles, when they sold whole shiploads of junk to Hebrew traders who assembled parts of widely different makes of out-of-date and condemned paterns, unloading them on the British public as sure-enough American wheels at prices for which the manufacturer would have been glad to supply standard machines; I fear that the trick proved so profitable while it lasted that it is being repeated in the case of American motor cars. I have seen enough of the American factories to know that the up-to-date car is equal to anything of its class to be found anywhere, while for a given price they can give more and better value than anywhere else for reasons set forth in the early part of this article.

The motor buses, so far as the public is concerned, give excellent service, but they are proving a very poor investment to the shareholders. This seems to be for the reason that the wear and tear of the constant stopping and starting is more than the ordinary system of gears will stand. One thing is plain, the motor bus is preferred to the horse-drawn vehicle. The same remark applies to the taxicab. There are now about 1,500 of these on the streets of London, and they seem to do a roaring trade. I am informed that the drivers are able to purchase cabs of their own by the deferred payment system, which shows that they are making money.

So far as the heavy truck is concerned, I saw but few of them on the London streets and most of those I saw were steam-driven. They were certainly very good jobs and were giving capital service, the driver had in most cases a trailer and was alone. It seems that about $7.50 per week is the average wage paid them.

I was much impressed by the beautiful way the professional chauffeurs kept their machines, in this respect they compare very favorably with their American comrades. It is also pleasant to see them all dressed in smart and practical uniforms. I would like to see American drivers so dressed. I was in Kingston on a day when there were horse races on at the race track near by and was much amused to see that for every horse-drawn vehicle which was going to or returning from the track, there were three motors. This surely is carrying the war into the enemy's country.

One gets the impression that cars are more noisy here than in America, this is owing to the fact that the bulk of them have the side chain drive. I shall make it a point to visit all the dealers in American cars and hear what they have to tell me, being in no way connected with or interested in the motor trade I may be able to gather some disinterested information as to what is really happening.—Charles Dawson.

SPARE WHEEL AND BALL-BEARINGS

Brooklyn, N. Y.—Editor Motor Age—In relation to the criticism by Henry Hess, published in the Automobile of September 17, page 401, involving the use of a spare wheel—in an emergency—as advocated and sold by the Spare Motor Wheel Co. of America, Ltd., the Stepney spare wheel, I desire to say, the placing of the extra wheel outside the regular wheel and fastened thereto, but utilizing the regular wheel hub—and, as a consequence, the ball-bearings in the regular hub—must, as Mr. Hess states, transfer the plane of the load. Thus is one bearing relieved of some of its burden, and if it is weak, it must accordingly congratulate itself, as it were. But if Peter is thus deprived of his burden, Paul must tote it for a while. If Peter is so weak as to rejoice at the loss of the burden, Paul must also be a little off of the top as well, since Peter and Paul are both in the same boat; two bearings in one wheel hub.

There was a time in the history of ball-bearings when their life was short, even with no great load. Time wrought changes, and in time a factor of safety crept into the zone, now dominated by ball-bearings. This factor of safety is claimed to be very large when purchases of ball-bearings are made, and experience has proven that the goods are generally delivered on a basis far more reliable than can be claimed for the delivery of coal. Builders of cars have great respect for the advice of the maker of ball-bearings, which respect is shown in a most satisfactory way, in that the bearings are, I might say, invariably larger than the makers of ball-bearings are wont to recommend. Under the circumstances, then, it does seem as if the Stepney spare wheel, or any other device of the kind, will scarcely disturb the obvious serenity of the ball-bearings in the wheel hub.

No man would be justified in riding in a motor car, if he was skating on the thin ice portrayed in the condition that is represented by the possible failure of the ball-bearings in the wheel hubs, merely because the plane of the load has been transferred a distance equal to the section diameter of a tire. As Mr. Hess says, limit the time of the use of the spare wheel to the time during which it serves its obvious purpose, but who would want to keep the spare wheel on any longer? On the other hand, the spare wheel will not level the road inequalities, and these inequalities certainly stress ball-bearings more than any spare wheel possibly can.

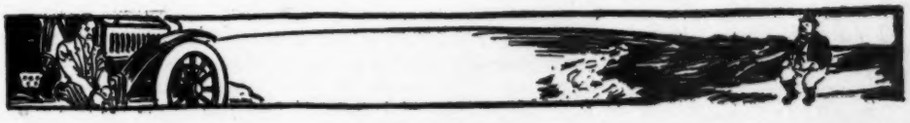
It is perfectly reasonable to assume that a motorist who has to apply the spare wheel will be a little more careful over considerable road inequalities than he would ordinarily be, and this difference will surely amount to more than that resultant of the small transfer of the plan of the plane of the load, due to the use of a spare wheel.

Motorists who are not sharps when it comes to mechanical hair-splitting, might think that ball-bearings are weaklings, so easily disrupted that the mere application of a spare wheel would do the trick. Where they reach such a point in the scheme of reasoning, mere inertia would impel them further, and they would, according to the law of probabilities, reach the final conclusion that a mile-a-minute in a car fitted with wheels that would surely come off if the ball-bearings were to go to pieces is too near heaven.—Thomas J. Fay.

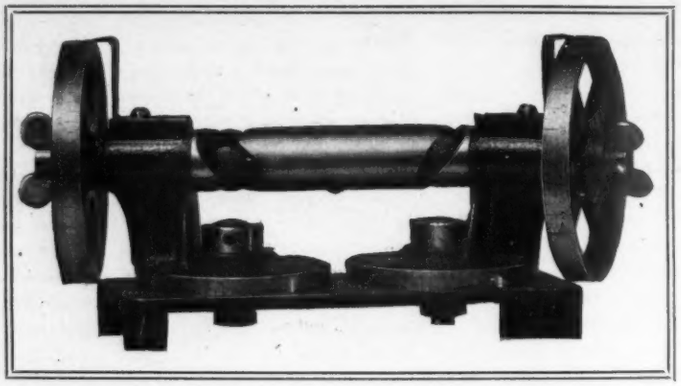
CHICAGO STEAMER NONEST

Berlin, N. D.—Editor Motor Age—Will Motor Age give me the name and address of the manufacturer of the Chicago motor car? I have an old Chicago five-passenger car and desire to obtain a new transmission for it.—F. L. Bowman.

The Chicago Automobile Mfg. Co., which manufactured this car, has gone out of business, and Motor Age is unable to give the name of the party purchasing the assets of the concern. This steamer made use of a flash type of generator and also incorporated a change speed gearset to avoid reversing the engine and running it at different speeds. The valves of the engine were of the poppet type.



THE LIMITATIONS OF THE UNIVERSAL JOINT



EXPERIMENTAL MACHINE BUILT TO DEMONSTRATE VANDERBEEK THEORY

By H. Vanderbeek

ALTHOUGH the universal joint, originally known as Hooke's coupling, has been widely used for feed mechanisms on machine tools, for driving drill spindles, and in agricultural machinery, it was not generally employed for the transmission of considerable powers until the advent of the bevel-gear-driven-rear-axle motor car. Fundamentally, the universal joint is a device for the transmission of rotary motion between two shafts whose axes intersect in a point, with varying angles with each other; and although modified forms of the device are made which allow for lateral displacement of the axes, it is the purpose of the writer to analyze the operation, and determine the peculiarities and limitations of the universal joint in its true form; the modifications must necessarily be considered as individual cases, and are outside the scope of this article.

In its simple form, the universal joint consists of two shaft-ends terminating in forks and connected to each other by a cross member having two bearing axes at right angles to each other and which engage with corresponding journal bearings in the forks. This arrangement is shown in Fig. 1, and although joints are made which differ in constructional details, the principles of this fundamental form apply in most cases. We will now proceed to the analysis of the movements of the several parts of the mechanism, when in operation, and for the sake of clearness, we will construct the diagrammatic view, Fig. 2, of the parts in the same position as in Fig. 1, and also the side projection Fig. 3.

Assuming that the joint has a position as shown in Fig. 1, where the fork B lies with its shaft axis and its cross axis both in the plane of the drawing and the fork A with its shaft axis in the plane of the drawing, and making an angle of θ with the axis of B, then the cross axis will have a position perpendicular to the plane of the drawing. It is evident that in rotation the extremities of the fork B will always move in the line c-e, Fig. 2, and in the circle c′-g-e′-i, Fig. 3, while the extremities of the fork A will describe the line b-a, Fig. 2, and the projection of this trace, in Fig. 3, will be the ellipse, i-b′-g-a′. Starting from the position, c′-e′, as shown in Fig. 3, the fork B being at c′ and e′ and the fork A at i and g, we turn fork B through some angle β, then the trace of the point i, of the fork A will be along the ellipse and its location will be determined by the point of intersection of the ellipse and the line o-m, which is drawn at right angles to o-m′, since the projection of the cross axes must always be at right angles to each other, because the axes are themselves perpendicular to each other and one of them lies in the plane of the projection, Fig. 3.

We have then determined the projection, in Fig. 3, of the cross axis of A in its new position, but since this line in its true position lies in the plane b-o-a, it is necessary, in order to determine its actual position, to swing the plane b-o-a into the plane of Fig. 3, and we then find that the point h travels to k, and that o-k is the true position of the cross axis of A in relation to its shaft axis, and that the member A has moved through an angle oc while the member B, has moved through an angle β. It is now necessary to determine the dimensions of the angle Ω* in terms of the angles β and θ.

From the properties of the ellipse we know,

$$fk:fh :: oi:ob'$$

where oi is the semi-major axis and o-b′ is the semi-minor axis, and from Fig. 3, we see that

$$fk:fh :: \tan.\ \Omega:\tan.\ \beta$$

therefore: $\tan.\Omega:\tan\beta :: oi:ob'$

but, $oi=Ob$ and $ob'=ob\cos.\theta$

therefore

$$\tan.\ \Omega : \tan\beta :: ob.\ \cos.\ \theta$$

or,

$$\tan.\ \Omega = \frac{\tan\beta}{\cos.\theta}$$

which is the algebraic expression for the angle moved through by B, in terms of the inclination of the shaft axes and the angle moved through by A. It will be noted that when $\Omega=\theta$ $B=O$ and also that when $\Omega=90$ degrees $\beta=90$ degress, or in other words, that four times in every revolution, the two forks stand at 90 degrees with each other, and it is also evident that the maximum variation will occur midway between these positions.

Referring again to Fig. 3, and continuing the rotation of B for 90 degrees, we see that o-n of A will be at o-n′ and is behind the member A an angular difference

*Note—$\Omega=\alpha$ in Fig. 3.

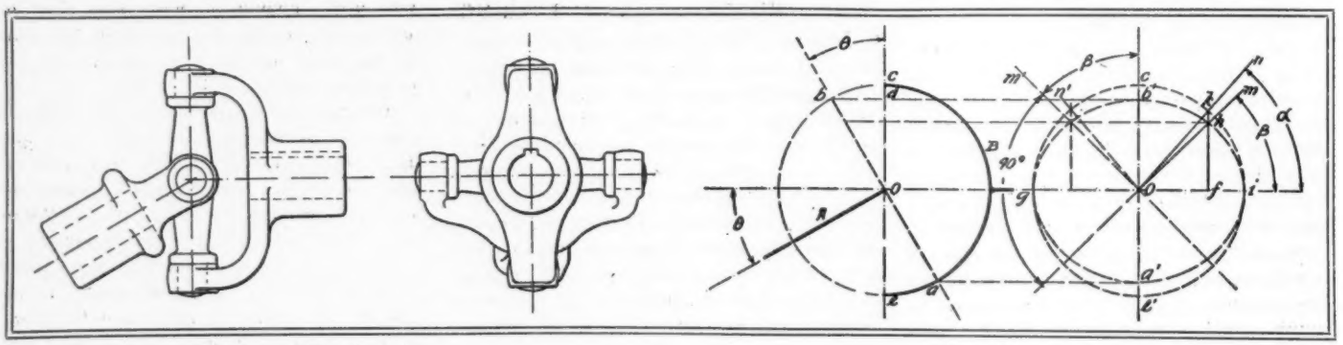


FIG. 1

FIGS. 2 AND 3

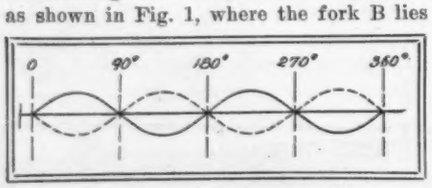


FIG. 4

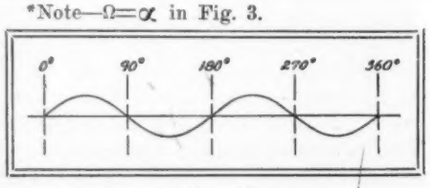


FIG. 5

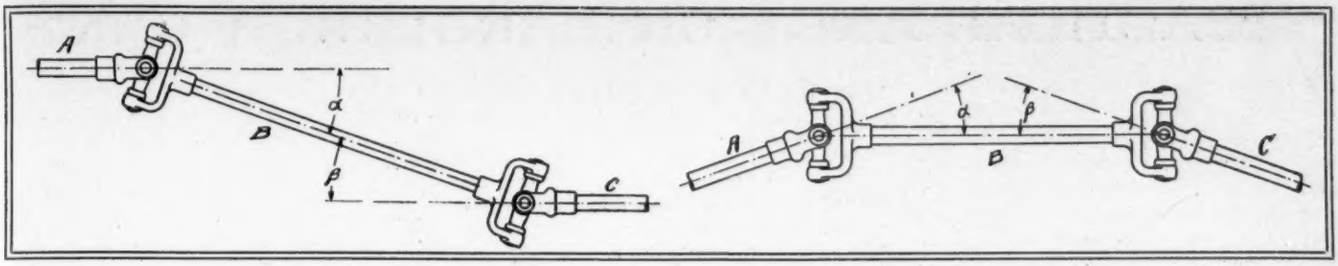


FIG. 6

FIG. 7

equal to the amount it was in advance in the former position, or in other words, its angular position is now negative while it was positive before. The angular position must not here be confused with the angular velocity. From what we have seen we may conclude that this same angular relation is repeated in the two remaining quadrants of the cycle, and we may plot these relative positions as shown in Fig. 4.

In practical application of the above, the maximum angular variation between the two members is probably of more interest than the angular velocity ratio, and in order to present this variation in concrete form, the following table will be of value:

Angle θ between shaft axes	Maximum angular variation	Length of arc, of circle of 3" diameter
5°	6.57′	.00286 inches
10°	26.35′	.01149 inches
15°	59.60′	.0260 inches
20°	1°46.90′	.0466 inches
25°	2°49′	.0737 inches
30°	4° 7′	.1077 inches
35°	5°41′	.148 inches
40°	7°37′	.199 inches
45°	9°35′	.251 inches

The angular variation and the length of the arc in the above are given as the numerical difference, which occurs both positively and negatively, twice in every revolution.

Recognizing this defect in the operation of a universal joint, it is customary, where smooth running between driver and driven parts is desired, to use them in pairs; the effect of this arrangement is to correct the variation of one joint by the complementary variation of the other. The graphical illustration of the effect of using joints in pairs, may be shown by referring to Fig. 4, and superimposing on this curve, that of another joint, in phase with the first but of opposite sign, as shown in Fig. 5. The resultant of which is a straight line.

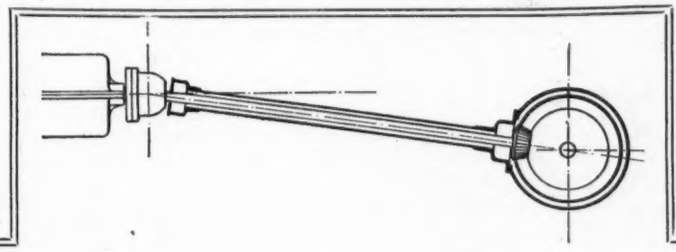
The conditions, however, which must be met in order to give this result, are: that the fork axes of the stems of the intermediate shaft B, must lie in the same plane, and that the angle between both extreme shafts and the intermediate shaft shall be the same; this may be either as shown in Fig. 6, or as in Fig. 7, so long as the angle oc equals the angle β. Evidently, the intermediate shaft B, will have a varying angular velocity, but as this member is of small diameter and of light weight its non-uniform motion will cause no trouble in ordinary cases. It must be borne in mind, however, that we deal here only with that condition in which the axes of the driving and driven shafts A and C, lie in some common plane; an analysis of the case where these shafts lie in different planes is more complex and is beyond the scope of this article. In the application of the universal joint to the main drive of motor cars, designers have commonly chosen one or the other of the arrangements shown in Figs. 8, 9 and 10.

The construction as shown in Fig. 8, includes only one universal joint, and the torsion-resisting member is concentric with the extension of the pinion shaft. In Fig. 9, one universal joint is used at the forward end of the propellor shaft, and the connection with the pinion shaft is by means of a semi-universal or more properly, a flexible coupling, which is universal only to a small extent and its function is to allow for discrepancies in alignment and end motion and it normally works in practically a straight line. Fig. 10 shows the use of two full universal joints; the torsion resisting member being independent, as is the case in Fig. 9.

It will be noted that in the construction, Fig. 8, the driving pinion will have the varying angular velocity of a single universal joint, and the amount will depend on the angle at which the joint operates. The effect of the arrangement Fig. 9 is the same as that of the arrangement Fig. 8, but in Fig. 10, it is possible by means of the double joint and proper setting, to eliminate the variation, and the pinion will have a constant angular velocity ratio with the change gear shaft.

By referring to the table given above, we may note directly the approximate variation from normal, at the pitch line of the driving pinion, for conditions such as shown in Figs. 8 and 9; the amount of the variation given having been calculated on the basis of a pinion diameter of 3 inches.

The foregoing calculations are not intended to discredit any one type of construction, but rather to indicate the laws which determine the practical limitations of this particular type of mechanism. In conclusion, it may properly be said, that familiarity with the universal joint breeds respect, and although it seems to be called into service only as a last resort, the generous wearing surfaces, low rubbing speeds and smooth operations of a well designed universal must appeal as having mechanical virtues worthy of consideration. Given the same amount of time and thought in development which has been expended on the theory, design and manufacturing methods of bevel gears, it can easily be imagined that the universal joint would, in many cases, do better work than its accepted rivals.



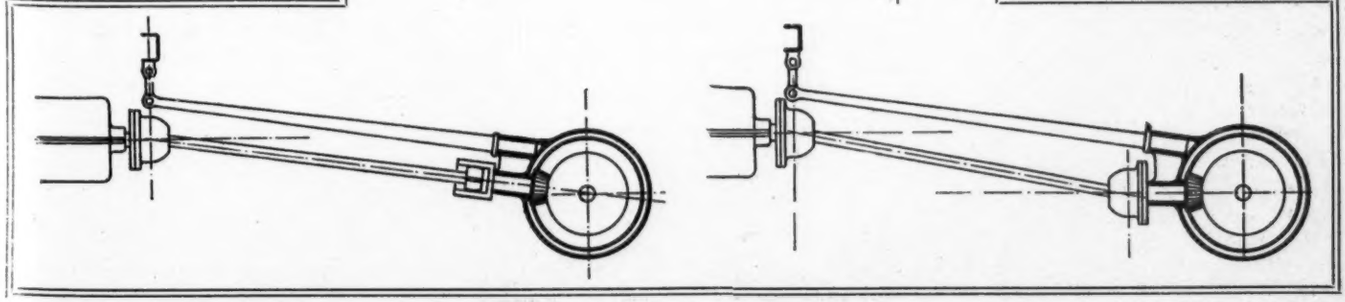


FIG. 9 FIG. 8 FIG. 10

PRACTICAL HINTS ON HANDLING A CAR

By Arthur H. Denison

IT WOULD be hard to find two drivers who would handle a car alike. This is due to the experience the drivers have had, and their knowledge of the theory and principles of motor car driving and control. The owner of a new car will find that he cannot get as much out of it as the demonstrator for some little time, or till he is thoroughly accustomed to the car and knows how to handle it, whether traveling uphill or on the level.

Given suitable conditions, the gas engine will run indefinitely. A very slight fault will often cause an enormous amount of trouble, the symptoms of which may not be plain enough to enable the trouble to be located directly, and the whole system must be gone over sometimes before it is located. It is, therefore, necessary to know just what is happening under the bonnet, and just when some things should happen, that reasonable satisfaction may be derived from the car. There is no car that can be expected to be free from trouble, for even the best workmanship and material may give way sometimes.

If a motor does not start on the first turn of the crank there is nothing radically wrong. On the first turn, or first piston passing over compression, the resistance due to compression may be felt, but the vapor compressed may not be a combustible mixture. It may be necessary to throw all four pistons over, and this will allow all four cylinders to be filled with a fresh charge of gas. The motor will then usually start on the next turn. While the modern carbureter is very sensitive, the height of the gasoline in the standpipes, as controlled by the float, may be adjusted so low that the suction from the motor, when turned over by hand, is not sufficient to raise any gasoline, yet when running will work perfectly. There is, what may be termed, a critical adjustment to all types of carbureters and each has a corresponding throttle opening that has a great deal to do with the labor necessary to start the motor. This adjustment is not alike on any two carbureters and may range from a throttle opening of two or three notches to half or three-quarters on the control quadrant. If the throttle is open too much, and the motor being turned over by hand, the inlet valve is open for an appreciable length of time, and the piston is traveling at a very slow rate of speed in comparison to that when running. Under these conditions the rate of speed of the air currents flowing through the carbureter is so low that gasoline is not drawn from the spray nozzle, and though a certain amount of vapor is lifted by the column of air passing over the gasoline, the quantity is not sufficient to make a mixture that will ignite. On the other hand, if the throttle is not open enough the motor will choke itself, drawing too much gasoline. The suction is strong enough to draw the gasoline, probably in the form of fine drops, into the cylinder, where it is vaporized under the heat of compression and will either provide a mixture too rich to ignite or one that will burn so slowly that sufficient power is not developed to carry the motor over the following compression. Many motors will not run satisfactorily till thoroughly warmed up and the warm-air inlet or hot-water jacket to the carbureter cannot furnish their necessary quota of heat until the motor has been running for some little time.

The position of the spark lever when starting is important. If the car is provided with jump spark ignition, the system is usually arranged to permit starting on the spark. To allow this the full retard must be arranged so that the cylinder, whose piston is on its firing stroke, will allow ignition to take place with the piston half-way down. Here the tension of the gas in the cylinder is very much less than that when on the dead center. If the motor has been standing and is cool, the tension of the gas falls to atmospheric pressure on account of the leakage and giving up of its heat. For this reason the term "starting on compression" is not correct. The motor will not retain a charge of gas at a pressure above that of the atmosphere for any length of time because of leakage through the piston rings, etc. To prove that it is not compression but merely the expansive action of the gas ignited at atmospheric pressure, which causes motor to start, the spark plugs may be taken out and replaced, and if the mixture remaining in the cylinder has the proper proportions of air and gasoline the motor will start when the spark is switched on. When the plug is out there would be an open passage from the compression space to the atmosphere, and according to the laws of air and gas, any pressure in the cylinder above that of the surrounding atmosphere would be immediately dissipated. This may be proved also by merely opening the petcock of the cylinder on compression. If the spark lever is fully retarded and the current switched on, igniting the gas, the resistance due to inertia must be overcome. The piston, already half way through its stroke, will only travel an inch or so further before the exhaust valve will open and the remaining energy developed by the charge will be directed out through the open port. Unless enough energy is stored in the flywheel to carry the motor over the following compression the motor will stop. This may happen whether an attempt is made to start on the spark or by turning it over with the starting crank. In either case one explosion may be heard and then the motor stops. This trouble is rather mysterious, but can be readily overcome by advancing the spark lever the distance of an inch to an inch and a half along the circumference of its quadrant, thus securing the initial impulse taking place just after the piston has commenced the power stroke. One quick jerk, throwing the piston over compression will do more good than 5 minutes' slow cranking. The manufacturer should set the starting crank so that the maximum compression should be felt when the crank is about 10 degrees past the horizontal. If the motor starts readily on the spark, and it will if the carbureter adjustment is such that the mixture is a trifle rich, the usual practice is to throw the control lever to full retard to secure the initial impulse and then advance it to normal running position.

A motor equipped with make-and-break ignition usually has the igniters set fully retarded, i. e., to fire a fraction of an inch past dead center. On a motor of this type a back-fire is very liable to occur if the spark lever is advanced only a few notches. In order to escape the serious consequences that may follow this—many arms and wrists have been broken—a good habit to cultivate is that of returning the spark advance and throttle levers to the proper position for cranking the motor before leaving the car, or immediately on stopping the motor. When on the road the best results are usually obtained by advancing the spark lever as far as possible without the motors pounding. With the make-and-break system it is customary to advance the igniters to a fixed point and control the speed of the car with the throttle. Rules for handling the spark lever cannot be laid down, as conditions vary with the kinds of roads being traveled, difference in motors, etc., but a good driver will not allow the motor to pound.

A good feature on an American car is an adjustment that will allow the operator to throttle his motor to as low a speed as desired when the load is off. The connection is placed on the dash. The general practice among drivers, when wishing to keep the motors running slowly, is to retard both spark and throttle levers as much as possible, the adjustments being usually set to allow the motors to just keep running under these conditions. This practice is responsible for the need of grinding in valves at short intervals. With the spark lever retarded, the gas is ignited so late in the stroke that the exhaust valve opens before the charge is burnt, consequently the gas at a very high temperature is passing between the valve and its seat, heating both to an unneces-

sary extent. The cool gas, coming in on the suction stroke, will help the water-cooling system to keep the valve cool, but even with this help it will not withstand the heat very long and is soon warped, allowing leakage during the compression stroke. The remedy is to adjust the throttle so that the motor may be run as slowly as desired with the spark advanced so that ignition is taking place nearer dead center.

Successful operation of the clutch cannot be expected unless the clutch, the pedal connections and universal joints between the clutch and gearbox are cared for. Clutches employing leather as one of the friction surfaces, such as the cone and expanding types, need pretty regular attention. To insure the best results the leather should be kept soft and pliable as a razor strop. The multiple-disk clutch usually runs in oil and gives little trouble. As the oil has to be squeezed out before the clutch can take hold, this type of clutch is easier on the car and less liable to be injured by careless handling. It is by no means rare to see the rear wheels of a car jump off the ground when a fierce clutch takes hold. This racks the car a great deal, and is very destructive on tires. Castor oil or neatsfoot oil make an excellent dressing for clutch leathers.

Skillful handling of the gear-shifting lever on a sliding-gear system can only be obtained by practice. One of the best tests of a driver's skill is to notice the way he handles his gears. A skillful man, accustomed to a car, will pass through all speeds, either up or down, noiselessly, unless for the click caused by the lever bringing up against the quadrant. There are two systems in general use, and they are termed the progressive and selective. In the progressive, the different gears are meshed by a lever working in a single path, either forward or backward. In general practice it is arranged with three speeds forward and reverse, occasionally four speeds forward. It was brought out by the Panhard company, which still uses it.

The selective system originated with the Mercedes company and has many advantages over the progressive. The name—selective—indicates that the neutral position of the lever is so arranged that any gear combination may be engaged, and the lever may pass from any gear directly to neutral without passing through any other gear, something impossible with the progressive system.

With the progressive gear the system is usually arranged so that reverse is in mesh with the lever at the extreme rear and high speed at the forward end of the quadrant, the intermediate speeds proportioned in between. The lever usually has a button on top, controlling a latch that locks it in place at any desired speed by fitting into a slot cut in the quadrant. The easiest method of securing the proper amount of travel, from one speed to another, is the following: Press the button or finger clasp that releases the latch from its slot, and while holding it released move the lever far enough to prevent it slipping back into the slot when the button is released. The latch will now be pressing against the quadrant bar, and the lever can be moved until the desired gear is properly meshed, where the influence of the spring will pull the latch into the slot and lock the lever. If the latch is held released the result may be that the lever be carried too far into the following neutral. If this occurs the best thing to do is to stop and come back to first speed again.

The progressive gear, as worked out by the Packard company, does not have a locking device on the lever, the same result being obtained by a device in the gear box. When shifting from first to second, or from third back to second, the lever should be carried rapidly forward or backward until the gears are felt to engage. The locking device, though not automatic, will check the travel of the lever, and if the gears are properly in mesh will provide sufficient resistance to the movement of the lever to assure the operator that the gears are correctly in mesh.

Drivers handling the selective system have two things to remember. The first is to keep it well oiled that the lever may slide freely sideways. The second is to keep their hands off the button unless it is desired to enter reverse. The lever works in an H slot, the cross bar of which represents the neutral path. Reverse is reached by providing a third path outside, and to prevent the lever entering it accidentally a projection is cast on the plate. The lever is provided with a latch, controlled by the usual button on top, and when the button is pressed the latch is thrown to clear this projection. The lever will then pass freely to engage with the reverse shifting rod. To mesh the gear it is moved backward or forward in the usual way.

Some cars have appeared on the market with the speeds arranged like this R 2 4.
1 3
If on a hill and conditions demand a change to a lower gear, say, third back to second, if the driver handles the lever without touching the button, he will have no trouble. If he does, he is almost sure to enter reverse, with possibly serious consequences.

The clutch should be thrown as far forward as possible before any attempt is made to engage the gears. Some cars have appeared with only one pedal so arranged that the clutch was first released and further travel of the pedal applied the running brakes. The different types of clutches in use and the care bestowed on them has much to do with the ease with which the gears may be engaged. The cone clutch, with its comparatively large diameter, is likely to spin longer than the multiple disk. Any attempt to mesh the gears while the clutch is spinning will result in the gears growling, possibly chipping the teeth. Few types of clutch can be depended on to stop spinning as soon as the clutch pedal is pressed, and it is advisable to wait a moment or two before attempting to engage the gears. Occasionally the shaft will stop so that the teeth of one gear will strike the teeth of the other and prevent them meshing. When this occurs engage the clutch again for an instant, thus letting the clutch shaft spin, and after giving them time to stop spinning try to mesh the gears again. After the car has started and it is desired to shift from first to second, etc., speed the engine for a moment, close the throttle, then release the clutch and shift the gears. If the engine has not reached too high a speed this will allow the gears to engage quietly.

Never attempt to force the gears into mesh. If they will not engage without being forced, there is something wrong and jamming down hard on the lever is only liable to aggravate the trouble or spring the shifting arm or lever. The noise or growl so frequently heard is caused by the attempt to force the gears together while they are traveling at different rates of speed. This serves to grind and chip the edges, occasionally breaking the teeth. Judging from the condition of the gears from the majority of cars in the repair shop, the only conclusion is that the average driver seldom waits long enough before attempting to engage first speed. In some instances careless handling has resulted in allowing the clutch to take hold when only half the teeth were in mesh and the teeth were half ground away.

Very little can be said about handling the car on the road. The operator must handle each separate case as he meets it. New York has policemen whose sole duty is to regulate traffic. On the country road the farmer will either give the motorist the whole road or won't move until he has to. He isn't a bit particular whether he turns to the right or left. Similarly when following and trying to overtake another car on the road, the driver of the leading machine may try to prevent the other car from passing him, or may take that side of the road that looks best to him regardless of rules or laws. When passing little breaks in the road caused by water running off and carrying the road material with it, holes in pavement, etc., the shock of striking the edges is rather severe on tires and may be lessened by releasing the clutch for the moment and allowing the car to coast, always taking "waterbreaks" and similar rough spots straight on, so as not to strain the car unnecessarily. Care on many of these occasions will greatly save the car.

WHEELER & SCHEBLER INDUCTOR MAGNETO

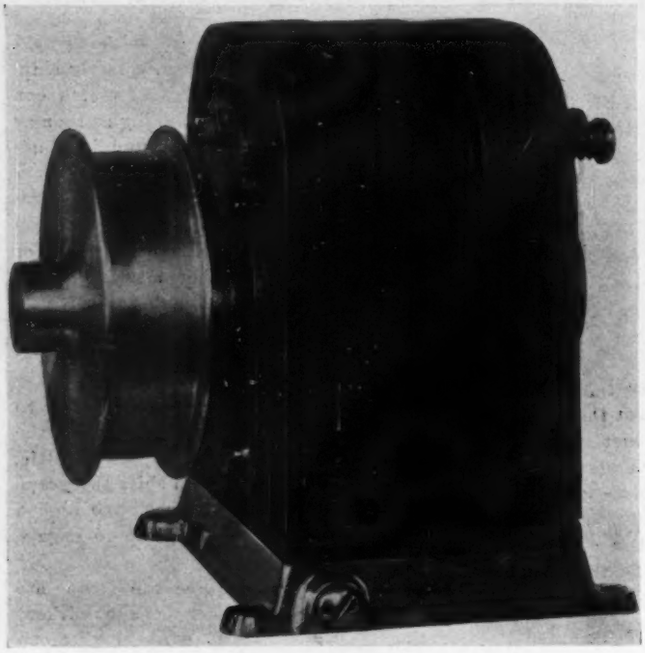


FIG. 1—WHEELER & SCHEBLER INDUCTOR MAGNETO

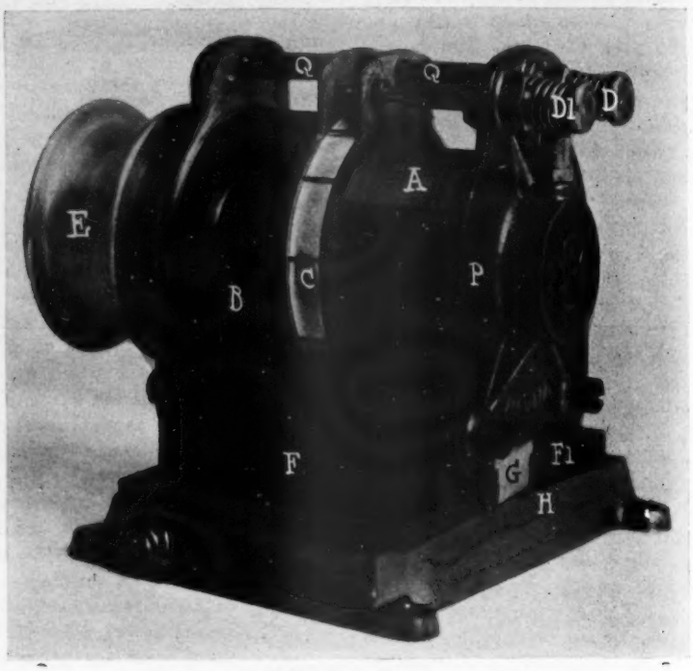


FIG. 2—W & S MAGNETO PARTIALLY DISMANTLED

IN ADDITION to its line of carbureters Wheeler & Schebler, Indianapolis, Ind., will market for next year an inductor type of low-tension alternating current magneto which takes the place of a storage cell in the ignition system of a car. The magneto is friction-driven from the flywheel or belt-driven from any other part of the car, and is made to rotate three or four times as fast as the motor crankshaft, giving a current of 5 amperes and 12 volts. For car work this inductor magneto can be used in connection with a set of dry cells, the same four-unit coil and timer being used for each and one set of plugs sufficing. Producing, as it does, an alternating current, it cannot be used for charging storage cells, but simply takes their place on a car.

In Fig. 1 is the magneto complete with three permanent horseshoe magnets, although a double set of three is employed in all of the latest ones manufactured. To the end appears the aluminum belt pulley. In Fig. 2 the magnets and a brass sheath within them are removed exposing every part of the apparatus consisting of a rotating shaft carrying a three-pointed inductor A and another B with a coarsely-wound coil C of flat copper ribbon between them. The ends of the copper ribbon connect directly with the binding posts D and D1, which completes the magneto. The winding C is stationary and nothing revolves but the two inductors A and B which are pinned to the shaft which carries the friction wheel E and which shaft revolves on a pair of F & S ball-bearings, one appearing in Fig. 4 at M1 carried in the end piece P of the magneto. In Fig. 5 appears an end view of the magneto showing in detail one of the star-shaped inductors with its three arms 1, 2 and 3 regularly spaced at 120 degrees and each arm consisting of twenty-seven laminations of high-frequency transformer iron pressed together and secured by soft iron rivets. The arms of the other inductor A Fig. 3 are alternated with those of inductor B and in this illustration is shown the copper ribbon winding C with the ribbon terminals at D and D1. The copper winding is given a white effect because of the layers of paper for insulation between the copper. The coil has seventy turns. In Fig. 5 F and F1 are the pole pieces against which the ends of the magnets bear and G is a separator of aluminum between them.

The generation of current in an inductor magneto of this type is briefly as follows: In Fig. 6 appears a diagram of an end view with A1, A2 and A3 representing the arms of one inductor and B1, B2 and B3 of the other, the coil C as before being the copper ribbon. When arm A1 is in contact with the pole piece F1 and arm B1 of the other inductor contacts with the opposite pole piece F then the lines of force between the north and south poles N and S of the magnets pass as indicated by the line L through the pole piece F1, through the arm A1, through the arm B1 and through the pole piece F to the south pole S, thus setting up current in the coil C. As the inductors rotate arm A1 breaks away from pole piece F1 and arm B1 from pole piece F and while A1 passes over the aluminum separator G between the pole pieces there is no current flowing. Immediately, however, that arm A1 comes in contact with pole piece F the arm B2 has reached pole piece F1 and lines of force pass once again between the poles N and S but from the arm B2 to arm A1, thus setting up in the coil C a current in the opposite direction to the first impulse. In this manner as the respective arms of the star inductors contact with the pole pieces there is set up current first in one direction and then in the other. As there are three arms to each inductor and the

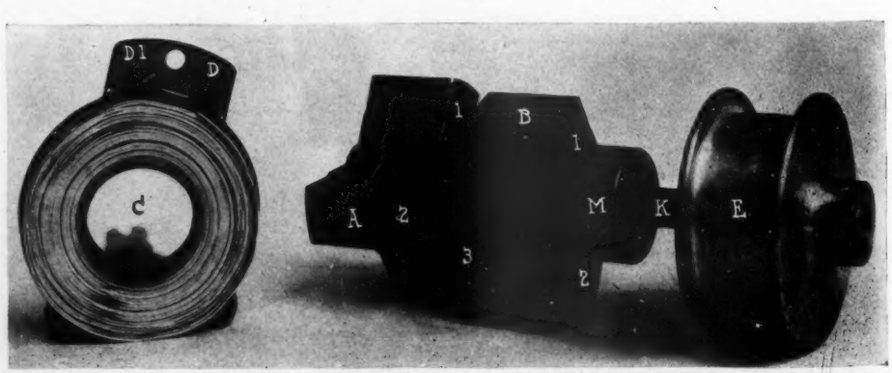


FIG. 3—COIL AND TWO INDUCTORS IN W & S MAGNETO

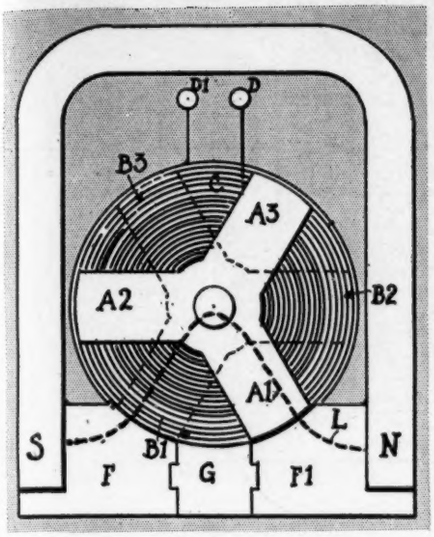


FIG. 6—DIAGRAM W & S MAGNETO

arms alternate the magneto gives six pulls per revolution or in other words six alternations per revolution.

In wiring a car with an inductor magneto of this type and a set of dry cells, the magneto and dry cells wires go direct to the switch on the coil box, thence of the primaries of the coil and thence to the timer. The magneto cannot be used with a non-vibrating coil and distributer in that no provision is made for changing the timing by altering the relation of the inductors with reference to the magneto poles while rotating.

STANDARD SPARK PLUG

The Associated Licensed Automobile Manufacturers has adopted a standard spark plug size, which has a ⅞-inch diameter, B, see illustration, eighteen pitch thread, and mil-hexagonal head. The following measurements apply to it: A, flange diameter, 1⅛ inch; B, ⅞ inch; C. flange depth, ⅛ inch; D, ⅞ inch; E, not less than ½ inch; F, not more than ⅛ inch, and H, ¾ inch.

TELESCOPE WIND SHIELD

Bertram & Lamoreaux, Detroit, Mich., manufacture what is known as the telescope wind shield, in that the end supports telescope within each other, the top half being the outer. Figs. 1 and 2 give end views of this wind shield—the first showing the shield up, the second down and telescoped. The upper half framework is a tube A, on the top of which is a slot S for carrying the glass of the upper half, while the lower half is supported in a tube B. When up, the glass is carried in the end 1 of the slot S, with its lower edge resting directly on the top of the glass forming the lower half. To lower the top half the lock nut C is loosened, which permits of the glass being dropped to the end 2 of the slot S. This done the sash will drop to the bottom when it is necessary to turn nut E, which rotates the bolt D and screws it into the head piece H, thereby anchoring the parts A and B together to prevent rattling. When this is done, the position of the two is as shown in Fig. 2. To raise the upper half, the nut E is loosened, freeing the shaft D from the head piece H into which it threads. Then the tube A of the upper glass is raised, the glass slipped to the end 1 of the slot S when it rests over the lower sash, and after this, tightening lock nut C brings both halves together and prevents rattling.

THREE MOTOR NECESSITIES

The Firestone Tire and Rubber Co., Akron, O., has brought out a very interesting non-skid tire in which the tread part carries the words "Firestone Non-Skid" in raised letters around the body of the outer casing, these letters forming the non-skid part.

The Trimont Mfg. Co., Roxbury, Mass., has added a couple of new styles to its line of wrenches. One of these is its drop forged trimo monkey-wrench made in black and colors, in sizes of 6, 8, 10, 12, 15 and 18 inches. The other is a narrow jaw wrench made only in a 10-inch size and designed for close-quarter work, the jaws being narrowed materially to allow of use in places where the ordinary wrench is too large. It is light in weight and specially designed for motor car use.

S. F. Heath & Co., Boston, Mass., manufacture V-style belts suitable for driving radiator fans or lubricators. The leather used in these is made from selected hides and no filler is made use of. In addition to the V-style of belts the company also furnishes flat belts which can be used for these purposes.

COWLES FRICTION TRANSMISSION

E. P. Cowles, Dowagiac, Mich., is the inventor and manufacturer of a most interesting type of friction transmission of the disk-and-wheel type, in which the disk A attaches to the crankshaft of the engine and the friction wheel B moves on a jackshaft across the face of the wheel. Particularly interesting in connection with the operation of the set is that the wheel B is never out of frictional contact with the disk A, as generally takes place in friction gearsets, and as a result the jackshaft of the wheel B is not rocked away from the face of the disk in changing speeds, and then brought in contact with the disk, or is the disk withdrawn from the wheel when the wheel changes its position on the face of the disk to give different forward speeds, reverse or neutral.

In brief it is an automatically shifting set controlled solely by the lever L. This

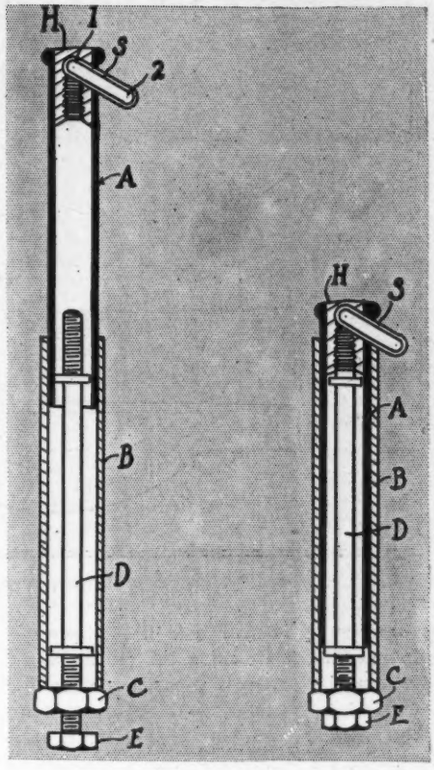
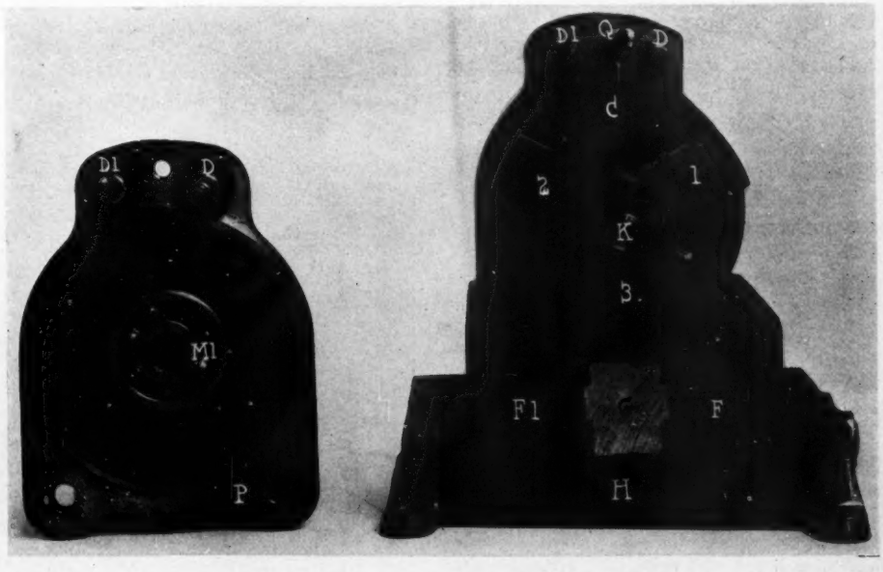
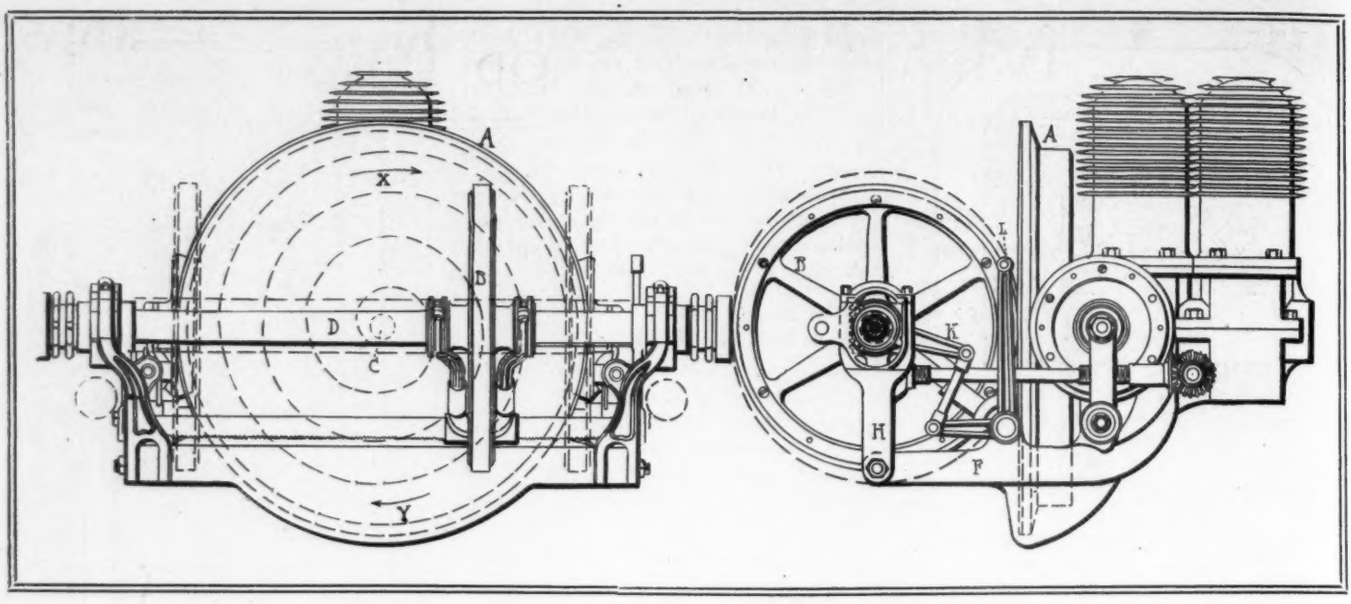


FIG. 1—TELESCOPE WINDSHIELD—FIG. 2



FIGS. 4 AND 5—VIEWS OF WHEELER & SCHEBLER MAGNETO



TWO VIEWS OF COWLES' UNIQUE AUTOMATIC FRICTION TRANSMISSION SET

gearset has a neutral disk C, 1¼ inches in diameter, and carried in the center of the friction disk A, so that when the friction wheel B bears upon it there is no transfer of power, this constituting the neutral point of the set. This plate is carried on a race of ball-bearings and is flush with the surface of the disk A.

Now comes the interesting feature, namely, how the wheel B is moved across the face of the disk A to get the different speeds without first being taken out of driving contact with it. This is all accomplished by raising or lowering the jackshaft D, which is accomplished as follows: In the side view of the gearset appear the arms F, coupled integrally with the crankcase of the motor, which at their rear carry the jackshaft supports H, which fork at their upper ends and have a toothed rack in the rear fork. A portion of the jackshaft bushing is toothed to mesh with this rack, and through arms K, secured to these bushings, and the lever L, it is possible to partly rotate the bushing, resulting in the raising or lowering of the jackshaft B. Supposing the wheel B to be on the neutral point C and the jackshaft raised, immediately the wheel contacts with the disk face above the neutral C, the disk rotating in the direction of arrow X will tend to carry the wheel B to the right, and the more the jackshaft is raised the greater will be this tendency, until finally the disk B will engage with the outer surface of the disk A giving high speed. To reduce speed the jackshaft B should be lowered below the center of the disk where the rotation is in the direction of the arrow Y, which will tend to carry the wheel B to the center. After the desired speed is obtained in any case and in order to avoid an increase of that speed, the jackshaft is immediately brought to its middle position, in which the jackshaft friction wheel will maintain its location. In the illustration the gearset is shown coupled to a two-cylinder, two-cycle, air-cooled motor.

MOTOR CAR LITERATURE

The Fisher Automobile Co., Indianapolis, Ind., is a souvenir edition of "The Booster," illustrates in page groups the interior of the Fisher salesroom and garage and also shows the different cars handled by the company.

The No. 5 issue of "The Speedometer" includes stories of the use of this instrument at the Briarcliff, on Murdock's transcontinental Packard, on the Glidden tour and other summer runs.

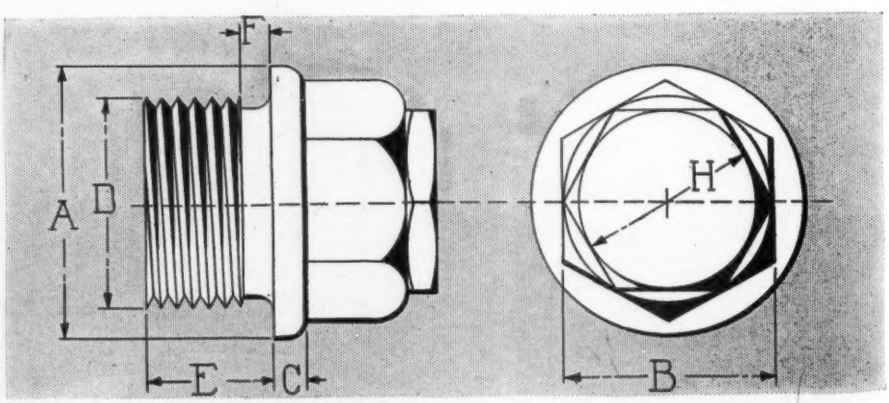
"What the Reo did on the Glidden Tour," issued by R. M. Owen & Co., is an eight-page folder setting forth in the briefest form the exact performance of the car during this contest.

The September 15 issue of the "Ford Times" is made particularly interesting by caricaturing the many Ford branch managers throughout the country, the issue taking the form of a souvenir for the branch managers.

The September issue of "Honk Honk," the official order of the Cincinnati Automobile Club, has an illustrated story on "Rules for Driving," in which are shown the proper courses to take at street intersections and corners. Included in the issue is route No. 10, covering Foster's crossing, Morrow, Wilmington, Xenia, Dayton, Middletown and Hamilton.

The Trimont Mfg. Co. has a useful booklet containing a report of mechanical tests made by the United States testing machine on its different types of wrenches. This report shows the deflection of weights from 200 pounds up, on the handles and other parts of these wrenches.

"Road Preservation and Dust Prevention" is 125-page cloth-covered volume dealing with the dust situation on roads. The book deals with the various preventives, such as oils, tars, and other preparations, and goes into detail on the relative merits of each and their mode of application. Different systems of road construction are described and deductions arrived at as to the dust raising nature of each. The author, William Pierson Judson, a consulting engineer, shows in his many chapters a comprehensive grasp of the subject. It is published by the Engineering News Publishing Co., New York.



STANDARD SPARK PLUG SIZE ADOPTED BY A. L. A. M.

Motor Car Shop Kinks

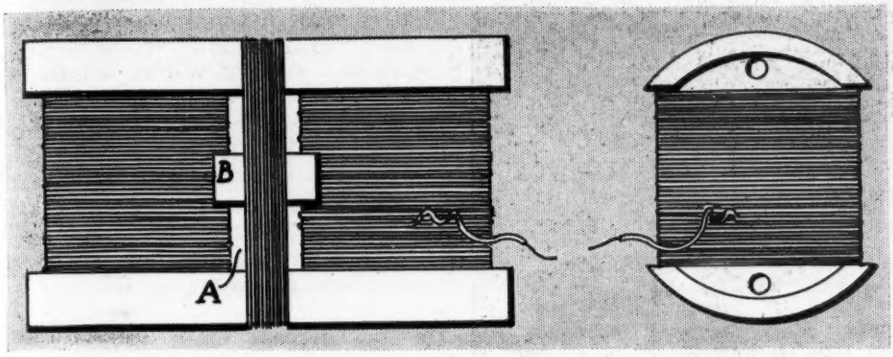


FIG. 1—REWINDING A LOW-TENSION MAGNETO

A LOW-TENSION magneto of early type may frequently be considerably improved by rewinding the armature with fine wire to give a higher voltage when cranking. The following directions will apply to such a case, and also to rewinding when the armature coil becomes damaged. In case it is desired to wind with smaller wire, the wire already on the armature should be stripped clean of insulation and calipered with a micrometer to determine its size. If it is an even size—28 or 30—it is probable that the next smaller even size will be suitable. The new wire should not be less than half the sectional area of the old, and about two-thirds will more probably be right. After the old wire has been stripped off, new insulation will be necessary next to the core. Fig. 2 shows the first step in insulating. First the inner end of the wire is soldered to the core, and then pieces of muslin A A are slipped over the core, being cut at one point B B to enable this to be done. Three such pieces are put next to each pole, with the cuts B coming alternately at opposite ends. Next a strip of muslin slightly wider than the core is wound tightly three or four times around the central body C of the core. After binding it with thread all the muslin is shellacked.

The winding process is best done in a lathe; see Fig. 3, in which the dotted lines indicate the dead center. The core is rotated backward, by crossing the lathe belt if necessary, and the wire is wound as smoothly as practicable, like thread on a spool. To hold the wire while it is being wound on, take a piece of cloth folded three or four times around the four fingers of the hand, and give the wire a loose turn around the cloth. If the armature is unprovided with centers these can easily be supplied. At intervals stop winding and hammer the partly completed coil flat by a block of wood and a light hammer. When the coil is completed twist the outer end two or three times around the next turn to prevent it from flying downward by centrifugal force—see Fig. 1. Next the whole coil is bound with thin, hard brass wire wound into the shallow groove turned in the armature poles for that purpose. Under this wire binding, next to the coil, is an insulating strip of mica A, Fig. 1, and a thin strip of copper commutator copper is best—B is slipped under the binding wire and its ends doubled over to prevent the brass wire from spreading. The piece B and the wire binding are soldered at several points, and particular care is taken to solder the ends of the binding wire fast. When this has been done the final operation is to saturate the coil thoroughly with shellack, giving it all it will take, and baking it for several hours in an oven.

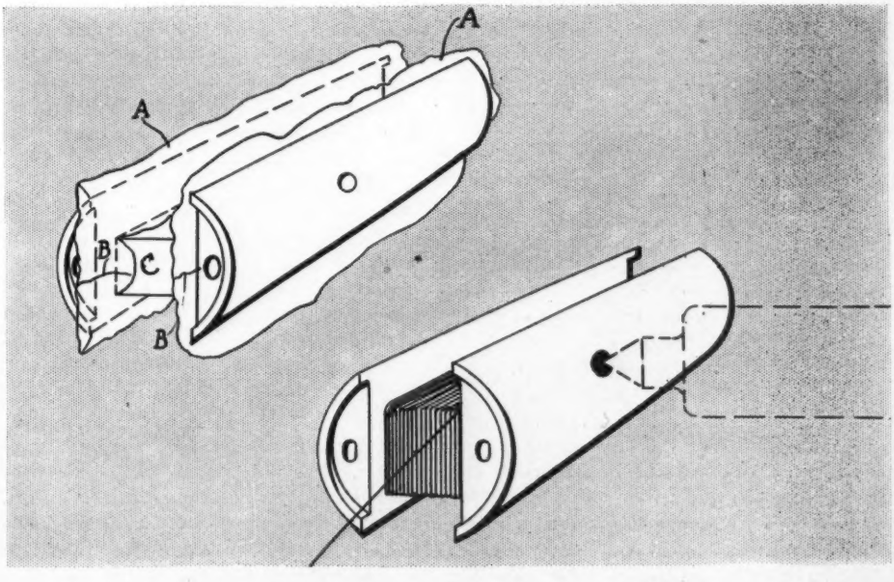
It is essential that the binding wires be drawn as tight as possible. This is best accomplished by replacing the armature shafts and centering them in a lathe, after which tension may be put on the binding wire as it is wound on by running it between two fibre blocks squeezed together in the tool post. This completes the entire process.

STRONG SPARK FOR CARBURETER

When a new carbureter has been put on an engine it is sometimes difficult to get the mixture near enough right to start the engine, which is obviously the first step in obtaining correct adjustment. This may be particularly the case when ignition is by an old style magneto, since these frequently do not generate a sufficient spark unless the motor is cranked quite smartly. If the ignition is by make-and-break it is easy to disconnect the magneto and substitute a battery and gas lighting coil. It is only necessary to disconnect the wire from the switch to the bus bar to which the ignitors are connected, and connect the battery wire in its place. Six or eight fresh dry cells and a coil will give a hot enough spark to ignite almost anything. The negative terminal of the battery is, of course, to be grounded. It does not take much running to exhaust the battery, therefore the magneto should be switched in as soon as the engine starts.

POSSIBLE CAUSE OF KNOCKING

Knocking which occurs once per revolution or every other revolution in an engine whose bearings are known to be tight, may be traced to the magneto, or more probably to the coupling through which the magneto is driven. Knocking at this point can generally be felt by touching the magneto bearing and the bearing of the magneto driving gear. Occasionally it may be found that the driving end of the armature shaft is loose in the bronze disk which is screwed to the armature core. Such looseness may easily be detected by rocking the shaft when the magneto is removed from the engine.



FIGS. 2 AND 3—STAGES IN REWINDING A MAGNETO

From the Four Winds

N S E W

RAMBLER CAR THAT MADE REMARKABLE DENVER-CHICAGO RUN

Record for Peerless—William Murphy of the Highland garage of Pittsburg broke the record for the Pittsburg-Cleveland run when he made the trip in just 4½ hours in a Peerless. He used the Firestone tires and did not have a single puncture.

Good Roads at Nankin—Of all the interior cities of China, Nankin can truly boast of having the best roads. Part of these roads are suitable for light motor cars and motor cycles, which up to the present are an unknown quantity in Nankin. The present system of locomotion is by ricksha or carriage. The motor car and motor cycles are a common sight in Shanghai and are operated as well as owned by Chinese, who indulge their tastes in this regard.

More Roadwork—The work of the state highway commissioner at Columbus, O., has almost doubled within the past few months. With the increased revenue for good roads which is being derived from the state law the work is becoming much greater and the highway department of Ohio is expected to become one of the most important of the state branches. The state emergency board held a meeting last week and made provision to pay for four additional clerks in the office.

Another Milwaukee Meet—The final racing meet of the year to be given by the Milwaukee Automobile Club, which successfully conducted a 24-hour contest and a 2-day derby on September 25-26, will be held at State Fair park track, Milwaukee, on October 10. The feature will be a 25-mile race between the Locomobile and the Pope-Toledo. Dr. J. F. Schreiber, Milwaukee representative of the Locomobile, will pit his model L, which won the 24-hour race 2 weeks ago, against the big Pope-Toledo, owned by O. Zachariah Bartlett, a wealthy grain man of Milwaukee. Herbert Lytle is nominated as driver of the Pope-Toledo and Bob Drach, the 24-hour winner, will pilot the Locomobile.

Waukesha Heard From—Waukesha, Wis., famous for its mineral water, claims the championship for number of motor cars in proportion to population. Waukesha has one car to every 220 inhabitants. There are thirty-five cars in the city, not counting the scores brought there every summer by southerners who resort there.

Sues for Lost Tire—About the first action of the sort is the suit of a Wethersfield motorist against the Adams Express Co. It seems that last September the motorist shipped a tire to the Diamond Rubber Co. and apparently it was lost in transit. Now the motorist wants $50 for that tire, claiming the express company was negligent.

Will Build a Hill—That Minneapolis has a live club is shown by the fact that at the next meeting of the directors of the club, consideration will be given the plan of building a permanent hill, along strictly scientific lines, for holding hill-climbing contests. The idea as mapped out at present provides for a hill ½ mile long, along the Minnesota bottoms in front of the new country clubhouse of the club at Bloomington. The course includes two rather sharp turns and the finish of the track would be right in front of the clubhouse porches and lawns, making an ideal spot for witnessing the contests. The entire course will be visible from the clubhouse. It is planned to pave the roadway with sandstone blocks for ½ mile, with perhaps 100 yards at the start and finish lines for the rolling start and whirlwind finishes. The grade would be 10 per cent at least and in places as high as 23 or 24 per cent. The road could be built about 20 feet wide. The Minneapolis hill will be completed so as to hold the first contest on Saturday, July 3, of the coming year; at least, that is the way things are planned out. Besides the opening contest which, it is expected, will be of national importance, many matinee contests will be arranged for the club members to satisfy the intense rivalry between owners of different makes of machines.

Motor Car as Mower—Washington university, St. Louis, Mo., has a very extensive lawn and long has used a Johnson mower, horse-drawn, to keep this lawn in shape but even with the horse supplying motive power the work was slow until Charles E. Murray, the chief gardner, purchased a Ford roadster and hitching the mower on behind, keeps the 130-acre grass plot in excellent condition. The horse took 2 days to accomplish what the car does in a few hours.

School Teacher Turns Mechanic—Thomas B. Jeffery & Co. of Kenosha, Wis., have gained a new recruit in the person of Professor M. B. Gilman, principal of the Durkee school of Kenosha. Claiming he cannot afford to continue to exist on the salary of a school teacher, Professor Gilman laid down his job and has entered the Rambler factory. He says: "There is absolutely no future in the teaching profession; the motor industry has the greatest future of anything I know, and that's why I have changed occupations. I do not think I shall ever be sorry for my change in occupations."

Milwaukee Ambitious—The Milwaukee Automobile Trade Association is planning a reliability contest, with Minneapolis the objective point. Nothing definite has been decided, but the contest will be pulled off late in October or early in November, at which time conditions would be severe and prove a real test on the cars. The association has not been active during the summer, leaving all Milwaukee sports and contests to the Milwaukee Automobile Club. The association pulled off a good reliability over a 330-mile course last spring, which was the last event it conducted.

Wisconsin's Latest—Is the motor car a beast of burden? Can the law regulating the control and keeping of domestic animals be stretched to cover the motor car? This question is to be solved by the police courts at Wausau, Wis. M. C. Ewing left his big touring car at the curb, silent and meek, and when he returned, it was gone. The next morning he found that a faithful minion of the law had impounded the machine. It being of 40 horsepower, the poundmaster believed that he was entitled to $20, the law prescribing a fee of 50 cents per animal in pound. Mr. Ewing got back his machine by buying twenty good cigars, satisfying for the nonce the faith-

ful minions. Still, they may get their demands if the police justice so decides. He has the matter "under consideration" at the present time.

Trying Dust Cures—The Pennsylvania state highway department is experimenting with dust preventives on Dauphin county roads near Harrisburg. The Deming preparation is being tried on the Paxtang-Rutherford road and a liquid asphalt preparation is being laid on several stretches in Reservoir park and on the lower Paxton road.

Business Men On Tour—Henry Keuchemeister, Dan Kirsky and F. J. Steiner, St. Louis business men, have just completed a run from St. Louis to Chicago and return in a Union six-cylinder touring car. They took a route through Springfield, Bloomington, Dwight and Joliet, and found the roads in good condition, their only trouble being with tires. Their car was equipped with Koehler Universal auto springs.

Maxwell Eight Breaks Record—The twelve-cylinder 180-horsepower Maxwell car in a trial over the Ventnor beach near Atlantic City shattered all records for the course by negotiating a mile in :31⅕. The big car was piloted by Arthur See, while the timing was done by Messrs. Sellers, Overpeck, Paul and Ross, of the Philadelphia Timers' Club. The former record for the beach was :34, by Walter Christie. The course only permits of a ½-mile start and a mile in which to slow down the car.

Order Helps Doctors—Director E. G. Lang, of the department of public safety, Pittsburg, has just issued a new order compelling physicians to carry Red Cross signs on their cars which will give them the right of way. Since the order was issued several physicians who have not been using motor cars have made inquiries at the big garages and one order was turned in last week, showing that the doctors are beginning to realize the immense advantage of a motor car in getting to and from their calls quickly.

Motor Car For Undertaker—John T. Cassel, of Goodwin & Cassel, funeral directors, of Milwaukee, is the first undertaker to lead a funeral procession in a motor car, and thereby he has set a precedent that will be followed nearly exclusively by Milwaukee undertakers. For a long time local morticians feared to introduce the motor car in this manner, and several feared to purchase motor hearses because of imaginary prejudice of the public. At the annual convention of Wisconsin undertakers at Eau Claire last week, however, H. M. Hoppenyan, of Ashland, first vice-president, and brother of Mayor Hoppenyan, agent for the White and Ford cars in Milwaukee, made a prophecy that motor cars would be exclusively used in funeral processions within 3 years. Mr. Cassel was present and on returning to Milwaukee brought the prophecy to immediate fulfillment.

Another Car for Milwaukee—The latest addition to the already large list of municipal motor cars in Milwaukee will be a $1,500 touring car for the board of school directors. The common council has just voted a $3,600 car for use of the police department, which already had a motor police patrol car. There are sixty-odd schools in Milwaukee, which must be visited frequently, and the plea of Secretary F. M. Harbach, of the school board, was answered without hesitation by the council.

Chalmers-Detroit Wins—Making fifty laps on a 1-mile circular track in 52:04⅘, a Chalmers-Detroit Forty carried off the honors in a special match race at San Antonio, Tex. The car, which was owned by E. A. Kalkhurst, the Chalmers-Detroit agent, defeated a Stoddard-Dayton owned by Dave Pryor. In the novelty race for touring cars held at the San Antonio track the Chalmers-Detroit Thirty won. The cars were required to carry five passengers each. At each lap all of the passengers had to be unloaded, the engine killed and another start made. The Chalmers-Detroit made the quickest starts and lapped the other contestants in the ten rounds made.

Rambler in Road Test—Two thousand and eighteen miles of steady touring, from Salt Lake City to Chicago in 10 days, over the most difficult roads and mountain passes, was the feat accomplished by Sandy Dunlop, of Salt Lake City, who piloted a Rambler roadster model 34-A over this distance. The car, which is owned by J. A. Pollock, of Salt Lake City, averaged 198 miles per day, during the dash of 2,018 miles from the Mormon country, and extraordinary time was made especially through Wyoming, where the roads had been made almost impassable by long rains. Dunlop ran the car from Chicago to St. Louis and back to Salt Lake City by the southern route.

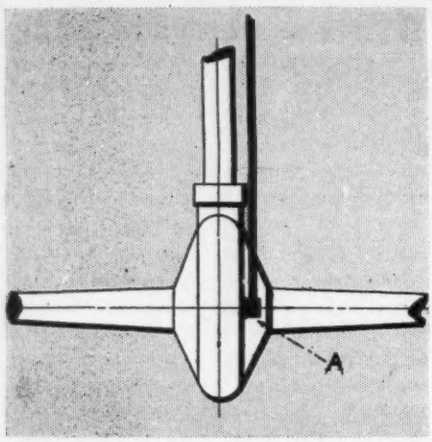
Busy In Connecticut—The increase in the use of motor cars has been so large during the summer in the state of Connecticut that in order to keep abreast of the times the state secretary has had to issue a new register. There was a time when one issue was as much as a season of 9 months required, but times have changed.

New Badger Club—The Green County Automobile Club, of Wisconsin, has effected organization and elected these officers: President, R. D. Gorham; vice-president, Dr. W. B. Monroe; second vice-president, J. C. Murdock, Brodhead; treasurer, J. H. Theiler; secretary, P. J. Weirich; directors, Dr. M. J. Morgan, Albany; G. Butler, Monticello; C. S. Dodge, W. J. Knight, Frank Millman, Rudolph Scheisser and C. W. Emerick, of Monroe. The headquarters are at Monroe, the county seat. The club has thirty-two members. The good roads problem will be the main object of consideration by the Green County club.

Used By Piano Dealer—Edmund Gram of Milwaukee, one of the leading piano dealers of the state of Wisconsin, has come to be one of the most enthusiastic owners in the city. Mr. Gram owns a Pope-Toledo touring car, and each week the machine makes three or four 100-mile trips into the interior of the state. Mr. Gram estimates that since May 1 he has sold $15,000 worth of pianos by means of the car, and says that it is the best thing he has found for getting close to all classes of people, rich, poor and well-to-do, saving time and great expense. He formerly used horses, but could make only comparatively little mileage in 1 day, and hotel bills made a big item. Now they are considerably reduced.

UNION CAR AFTER HARD TRIP FROM ST. LOUIS TO CHICAGO

THE CAUSE AND PREVENTION OF WEAR



Plan of centre part of back-axle showing torque-rod fixed at A, with no provision for horizontal movement. The back-axle moves somewhat sideways owing to slack and elasticity of springs.

Editor's Note—Paper read by F. H. Royce before the meeting of the British Association at Dublin on September 8, 1908.

THOSE who live in or visit London must have remarked the excessive noise of some motor vehicles now running on the streets of the metropolis. This noise, it is evident, is largely caused by wear which should be as unnecessary as it is disastrous to the owner and to the motor movement. The personal experience of the writer has been rather of the private passenger motor car than of public and commercial vehicles, and although a paper on the remedy of the wear and consequent noise in public and commercial vehicles, by some one competent to write on the subject, would undoubtedly be very attractive, it is hoped that the causes of and remedies for wear in the luxurious motor carriage may be regarded, at least, as interesting.

Although the noise due to such wear may not be so apparent in these lighter and more refined vehicles, the prevention of wear is of importance in the interests of the large class who have adopted the motor carriage in place of horses and carriages, and any reduction in the cost of maintaining motor cars must be of benefit to the movement generally as encouraging their use. The subject may be dealt with under three headings: 1. Design. 2. Material and Workmanship. 5. Lubrication and attention. To obtain the best results, the conditions must be favorable under all three headings.

Design Most Important

It is extremely difficult to deal with questions of design without showing a large number of illustrations, but the following are a few examples of practices in motor design which are worthy of special attention:

It is at first difficult to believe, but an examination of cars at an exhibition such as the annual show held at Olympia and the grand palace, Paris, makes it quite clear that, while a certain small proportion of chassis are obviously designed by men who are good engineers and who have taken great pains and care to make their designs as nearly mechanically perfect as the conditions will allow, there are many chassis which show that the designer is either extremely careless concerning, or has little knowledge or perception of, the science of mechanics. These latter chassis may, after a certain number of poor pieces have been eliminated, be more or less workable, and may, if well manufactured, satisfy the average purchaser's examination; but, owing to poor mechanical features, are bound to be costly in maintenance.

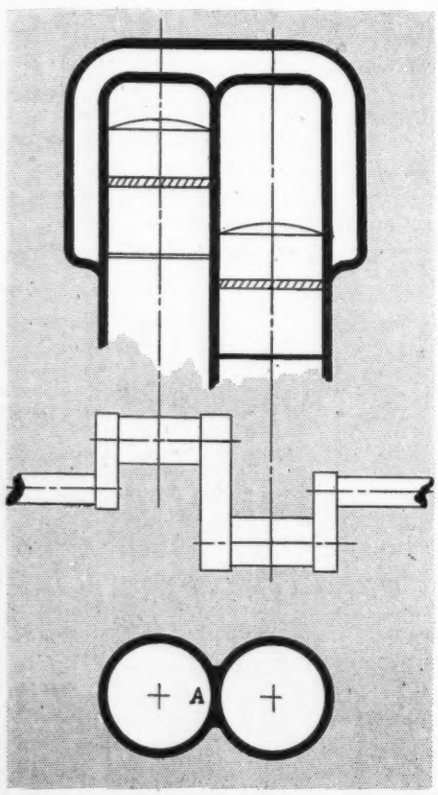
Bearings—For instance, one observes, may it be said, with a shudder, that in such important features as connecting rods, shafts in change gear boxes, road wheels, and wheels running on studs, the bearings are so disposed that the load or pressure

1 does not fall in the center of the length or bearing;

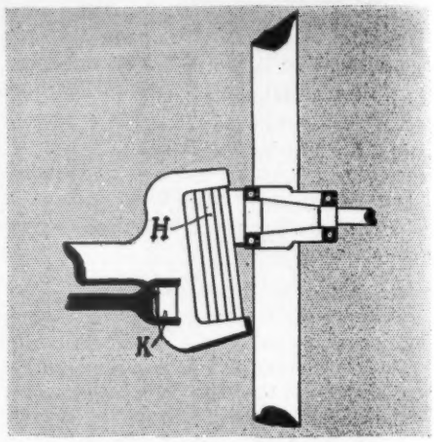
2 or, in the case of two rows of ball bearings, does not fall between the two bearings;

3 or, worse still, falls beyond and quite outside the bearing.

Absence of regard for the mechanical



A casting forming two or more cylinders in which there is no waterway between the cylinders. Disadvantages.—There may be a strip of metal at point marked A, heated on both sides, which is hotter than the remainder of the cylinder walls, resulting in bad lubrication and wear and perceptible loss of power.



Steering-head pivot inclined with cross-steering connection, with single jaw joint which must necessarily be vertical. Obviously bad mechanics in this particular construction and for so important a car part.

canon that pressure should either be centralized on or equally distributed along the whole length of a bearing is undoubtedly the cause of wear in many motor cars.

Deflections—Road and other stresses cause twistings and deflections which may throw out of alignment various parts. Take, for instance, a comparatively rigid crank chamber fixed to the frame. The frame, owing to road irregularities, twists, and its side members thus act as powerful levers tending either to break the attachments or twist the whole crank chamber. In the latter case, the bearings of the crankshaft become deflected from true axial alignment, causing excessive load to fall on small areas. Rapid wear, if nothing worse, must result. At various points throughout the chassis, similar departures from true alignment caused by various stresses must be anticipated, and should be provided for as far as possible.

Again, there are crankshafts which have evidently insufficient support, such as double cranks with no bearing between them. In these cases, again, we have the distressing knowledge of crank pins bent out of true alignment. Excess of pressure on local spots, and the crushing out of lubricants at such spots, must, we know, be attendant under these conditions, and more or less rapid wear must result.

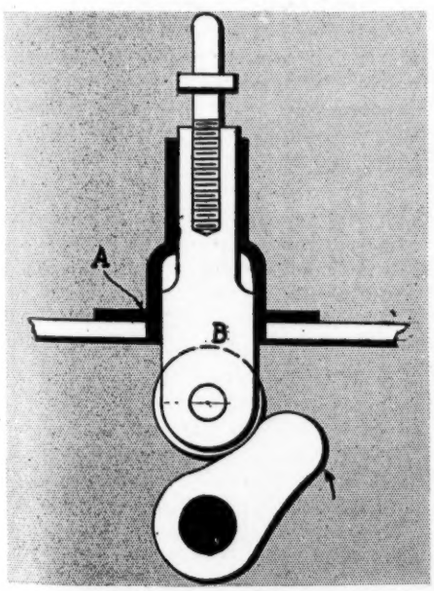
When one has to file a large surface, one tilts the file so as to attack a small area at a time. That is what is happening in the case of the unhappy bearings referred to, and it was to avoid such a state of affairs that the swivel bearing was introduced in ordinary shafting work with such marked improvement.

Another instance of improper deflection is found in cars in which the torque rod, used to control the back axle, is so fixed that no provision is made to allow of the movement which must take place when

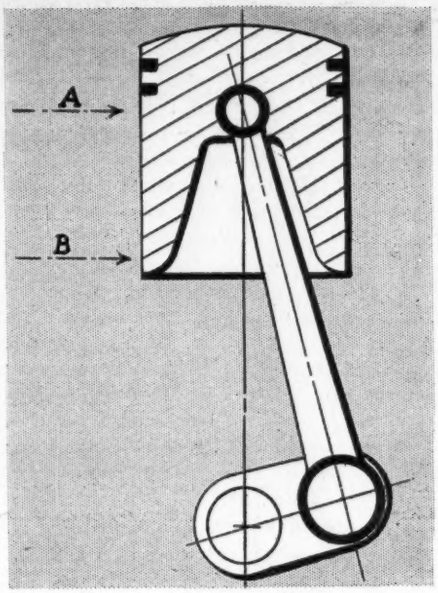
one back wheel rises higher than the other, owing to its surmounting an obstruction on the road, or owing to an uneven road surface. In such a case some slack must exist in the joints or the part must bend. This is not an infrequent example of the disregard for correct mechanical principles. Many similar instances could be pointed out. Unfortunately, the buying public are not experts, and it is only the expert who, in such matters, can see the difference between right and wrong.

Two chassis may, to the outward eye of the prospective purchaser, appear to be equally desirable and glorious, but one may obtain faults which even the expert eye might fail to detect. Six months' usage is sometimes insufficient to discover faults in design and their resultant weaknesses, but certified tests over prolonged distances, together with official examination and statement of condition at the end of the run, are, in the opinion of the writer, the surest guides in such matters.

Another point that may be mentioned in connection with design is the importance of arranging those parts which are subject to much friction—such as gears, road wheel bearings, and universal joints—should not only be fitted with oil-retaining devices, but also thoroughly protected against mud and water. One sees universal joints on quite a number of expensive chassis which are not provided with any case at all, or perhaps provided with cases which cannot retain oil against the high centrifugal force engendered. It is hard to imagine the lubrication staying on a joint revolving at from 300 to 1,500 revolutions per minute, if it has the slightest chance to escape.



Plunger form of tappet. Disadvantages.—Great pressure at point indicated by letter A. Friction is especially severe at the beginning of the lift of exhaust valve, because of remaining pressure in the cylinder on the head of the valve. Friction owing to length of travel of the plunger.



Piston-pin much too near hot end of piston. Disadvantages.—The thrust from reaction of the connecting-rod falls chiefly on the hot and poorly lubricated end of the piston.

In the absence of an effective oil-retaining case, these revolving joints may be trusted to get rid of any oil or grease which may be adhering to them, just as effectively as the hydro-extractor may be trusted to throw out the liquid. The same force will act equally well in either case.

The owner of a small car which had done well in some of the recent trials was heard to remark, after a journey of less than 60 miles, that he had to spend some time getting ready for the return journey. He secured a handful of nice, sticky grease, dived under the car, and dabbed it on the outside of the universal joint. It may probably be taken as certain that 99 per cent of the grease was thrown off immediately the car attained any speed. It must, however, be remembered that a case which is oil-retaining need not necessarily be water-excluding. Especially does this remark apply to road wheel hubs, which often allow water to be admitted. This is disastrous where ball bearings are employed.

Material and Workmanship

The choice of materials used in the construction of a motor vehicle are chiefly important for two reasons:

1—To avoid breakage.

2—To resist wear.

Time will only allow the writer to give a few notes on the latter.

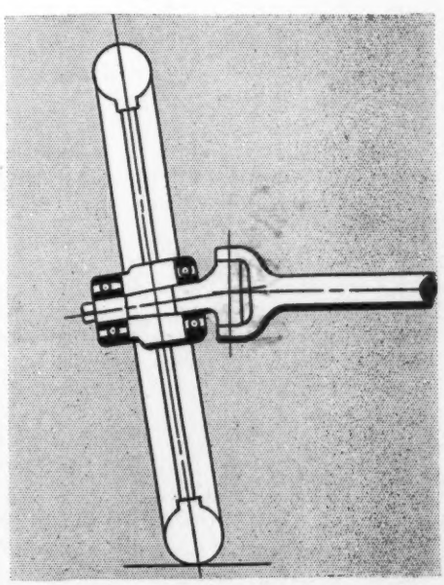
If the film of lubrication could be perfectly maintained, the material used for the wearing surface would be quite unimportant. Aluminum, one of the worst wearing metals, might even be employed; but one cannot rely on the lubricating film always keeping the surfaces out of contact. In the case of the crankshaft, the position of affairs is aggravated by the fact that the steel, in order to be really tough and reliable, is said to be in a state of pearlite, which, it is stated, under conditions of imperfect lubrication and in contact with hard bronze bearings is very likely to seize. Hence the success of such alloys as will run with such a steel shaft for a time fairly well without lubrication. Probably the most remarkable of these in that respect is lead, and alloys containing large proportions of lead, but the writer has always thought these too plastic to stand the severe mechanical stresses they are subject to in motor car work. Genuine babbitt metal of tin, antimony, and copper seems excellent for crankshaft work if properly applied.

In almost every other part of a car the wear is taken on ball bearings, or the parts are capable of being case-hardened.

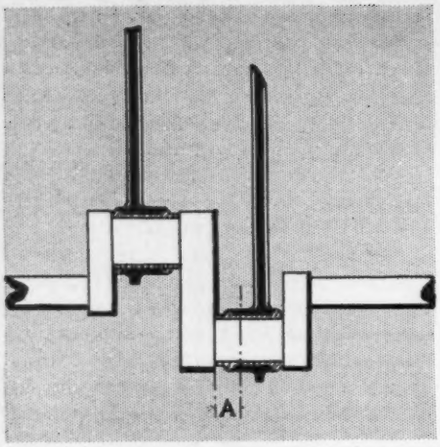
Excellent results can be obtained with a properly case-hardened shaft or other surface running with bronze bush or bearing. This combination is not nearly so exacting with regard to perfect lubrication as when one of the surfaces is of unhardened steel. Care should be taken to secure that the case-hardening is of sufficient depth and is free from soft places, the shaft being ground down a few thousandths of an inch to exact size on a precision grinding machine, and well polished.

Referring to gear wheels, which should in nearly all cases be thoroughly case-hardened, the selection of material is more important under the heading of breakage, because any mild steel will case-harden almost glass hard, but unless carefully selected and heat-treated, may be as brittle and weak as a zinc casting.

Ball bearings carefully arranged and well made are wonderful things, carry-



Front wheel considerably splayed to bring the load under steering pivot, resulting in load falling beyond inner ball race. Often accompanied by a very short hub, which brings ball bearings close together, the result being a very bad construction for this part of the car where the best design is needed.



In this case the cylinders are sufficiently wide apart to admit of waterway between them. But there is no centre bearing on the crankshaft between the two cranks. The big-end bearing is not centred with the connecting-rod. Disadvantage.—The pins tend to deflect excessively for want of intermediate support. The bearing is loaded and will wear unevenly, and the portion of bearing marked A is probably worse than useless, although it costs something to make.

ing enormous weights and bearing considerable ill-treatment, but the materials for these deserve careful selecting. It seems better that both balls and races should be made of a good high carbon steel—although even this is improved with a small percentage of chromium—but good results have been obtained with exceedingly deeply case-hardened mild steel. Really, this amounts to much the same thing as using high carbon steel, as the hard casing, to be satisfactory, should go nearly through.

It is worth while to repeat here that these ball bearings should, in all cases, be in oil-retaining boxes and be thoroughly protected from water, their most deadly enemy.

Lubrication and Attention

The system of automatic lubrication is a matter of design, but automatic and hand lubrication are herein dealt with under the one common heading of "lubrication."

Engine Lubrication.—Splash lubrication of the engine, which formerly was the common practice, had two main objections:

Firstly, it was difficult to maintain exactly the correct level of oil in the crank chamber; and

Secondly, the extent to which the oil arrived between the surfaces of the bearings and remained there was uncertain and imperfect.

Chauffeurs ascertained that their cars ran better, that their engines pulled better, were more silent, rattled less, when they gave them plenty of oil, and, as a consequence, cars, the engines of which are fitted with this type of lubrication, are seen belching forth clouds of blue smoke.

Whilst the public has suffered from the over-lubrication pest, owners have frequently suffered from under-lubrication, in the form of worn and sometimes seized engine bearings.

It has been found better, therefore, to adopt the forced system of engine lubrication which is used in high-speed steam engine practice, for the following reasons:

1—More Perfect Lubrication.—So perfect and consistent is the film of oil maintained by this system that there have been cases in which the connecting rod bearings have, apparently, never touched the crank pins, since the latter have shown throughout their surface a bronze color undisturbed by sign of wear or polish. In motor car work the engine sucks into the cylinders much road dust and grit, so that as good results cannot be expected as in the case of a stationary or marine engine; but for all that wonderful results have been obtained. For instance, the amount of wear in a connecting rod after 15,000,000 revolutions has been ascertained to be not more than 1-1,000th of an inch.

2—It Is Better that the Oiling Shall Be Constant and out of the Control of the Driver.—Under this system the engine is always sufficiently lubricated, and never over-lubricated. The lubrication is not dependent, as in the case of splash oiling, on whether the last 5 per cent of oil is or is not put into the crank chamber.

Car Lubrication.—The lubrication of parts of the car other than the engine is, as a rule, dreadfully neglected. To oil the joints, etc., situated under a car is a dirty job which does not appear to commend itself to most chauffeurs. Those who have been coachmen dread lubrication lest the car should look greasy or oily; but if these men could only realize the havoc which is played with their master's property by want of lubrication, they would—for they are, as a class, excellent, honest, and painstaking—make it a rule to get into a suit of overalls, lubricate every part, and end up by cleaning off surplus oil, thus satisfying their cleanly instincts.

Proper Lubricants.—Next, let a warning note be sounded as to what kind of oil to use. This can be roughly outlined as follows:

Do not use thin oil.

Do not use stiff grease.

Use oil of ample viscosity body, and of good lubricating properties.

And lastly: Use the very thickest oil, that will always be liquid, for all parts except the engine.

Lubrication, to be thoroughly effective, must be susceptible to capillary attraction and gravitation.

Much could be said on this subject, but I abstain for fear it should not be interesting to many, although too much emphasis cannot be placed upon the importance of this matter.

Reverting for one moment to a question of design, it should be added that there are points where the film of lubricant cannot be continuously maintained. In these positions, the ball bearing and the case-hardened surface comes as a valuable aid to the designer.

In summing up, it seems to be of the utmost importance that the designer should provide:

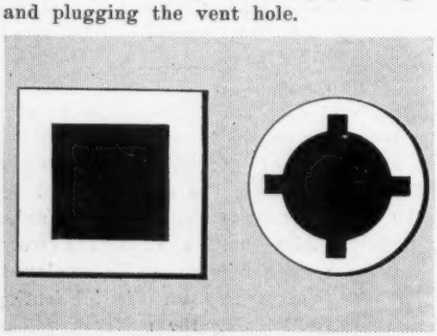
1. Satisfactory—and, as far as possible, automatic—means of lubrication.

2. Ample, or thoroughly case-hardened surfaces.

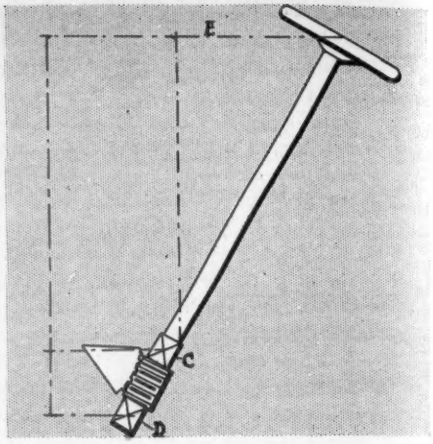
3. Protection against mud and water.

CLEANING GASOLINE TANK OUTLET

Sometimes waste or cotton fluff may gather in the outlet from the gasoline tank, or between the outlet and the tank valve, so that it must be poked out from above or below. If the filling plug is directly over the tank outlet, it is easy, with the aid of a flashlight and a stiff straight piece of wire, to push the obstruction downward after disconnecting the gasoline pipe below the tank valve. It is, of course, assumed that the outlet runs straight downward to the pipe union. If, however, it is impossible to poke out from above, the escape of gasoline when the poking is done from below, may be retarded by screwing the filling plug tight and plugging the vent hole.

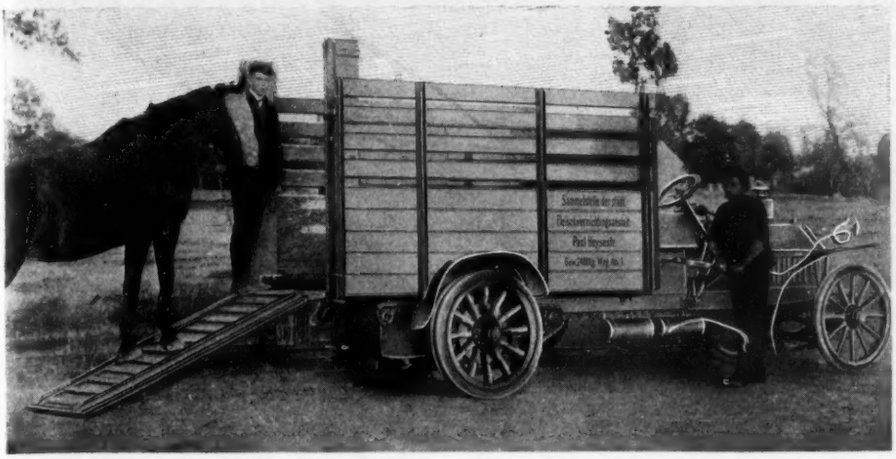


Square or key-wayed shaft. The parts are required to slide, although, owing to oblique action, or the parts being near the centre of the shaft, the load is intense. This arrangement is sometimes applied to propeller-shafts.



A rough sketch of a steering column of ordinary construction. The two bearings are very close together on the box, and the steering wheel overhangs a great distance from these two bearings. The usual pulling at the steering wheel with one hand to turn it round, together with its overhanging weight, causes excessive wear on the bushes. This, together with the worm and quadrant type, which has such a small area of contact, gives conditions favorable to rapid wear.

COMMERCIAL ENTERPRISE EVERYWHERE



MOTOR CONVEYANCE USED IN GERMANY TO CARRY ANIMALS

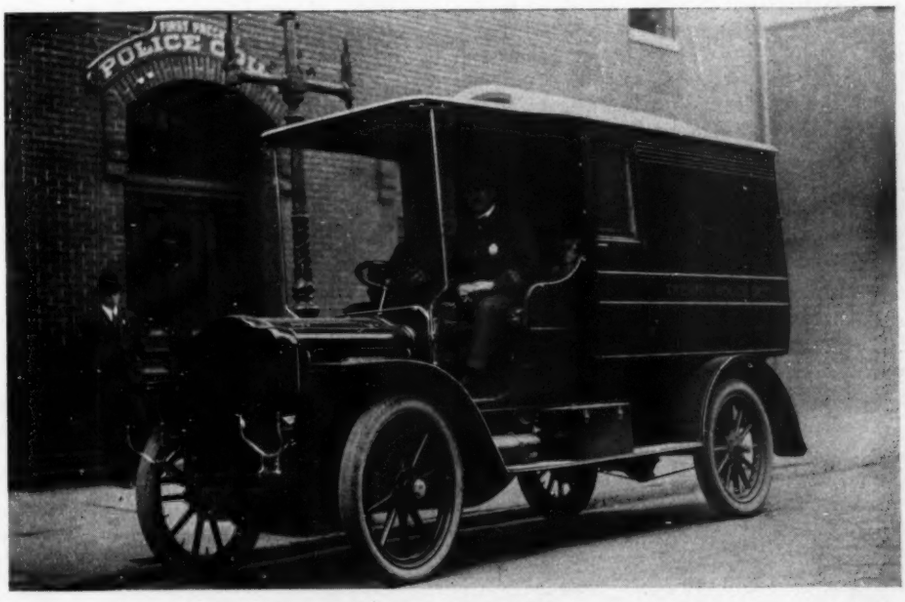
THE White ambulance and patrol wagon in the service of the police department, Trenton, N. J., is a particularly active vehicle. Since its entry when it retired the horse-drawn ambulance, it has performed the work of two of the Dobbin type in one-third the time. In response to a recent call it took just 4 minutes to cover 1¼ miles in a busy street. The scene of the accident reached, the stretcher work was done, and in less than a minute the patrol was headed for the hospital. Within 20 minutes it was again at headquarters, ready for another run, which was to transfer a load of prisoners from the courthouse to the county jail. This was a longer trip and before it was completed two additional calls were waiting for the patrol. Throughout the night it was a continuation of runs of this nature, in which the car regularly demonstrated its particular adaptability for work of this nature.

DARRACQ TAXICAB CHANGES

Several modifications have been made in the Darracq taxicabs familiar to New Yorkers by reason of their exclusive use by the New York Taxicab Co. The gilled tube radiator across the fore end of the frame has been abolished in favor of a dashboard radiator with thermo-syphon water circulation. By reason of this change the bonnet takes the form that up to the present has been almost exclusively associated with Renault cars. The new radiator consists of a series of circular plain copper tubes, there being twelve tubes in each circle and four or five circles. On the dashboard, and in the center of the inner circle of tubes is a flat blade ventilator driven by a belt direct from the flywheel at one-third increase on the engine speed. The dashboard space, left free on each side of the rear of the bonnet, does not allow a view of the radiator, as on most dashboard-radiator cars, this being enclosed by sheet metal superimposed by a perforated plate, the object of the enclosure at this point, of course, being to increase the draught of the fan. The passage of the steering column through the dashboard has not allowed the radiator to be mounted in a central position, but slightly to the left. As no tubes are visible owing to the front covering plate, this peculiarity does not in any way mar the appearance of the car. Advantage has been taken in the change of cooling arrangements to improve on the lubrication of the engine. On the 1907 taxicabs the flow of oil from the dashboard lubricator was assured by pressure from the exhaust, a system which possessed more simplicity than efficiency. On the new models the Lefebvre lubricator is of the force feed type, being direct driven off the ventilator shaft; thus the one belt operates both fan and lubricator. There has inevitably been a slight modification of the engine by the abolition of the water pump, but this is really the limit of the changes on the power plant. Transmission and final drive also remain as before, but suspension has been changed, the transverse rear spring being abolished in favor of three-quarter elliptics, a type of suspension which is being more and more generally adopted by European constructors. There has been a strengthening of the steering gear and modifications on the connecting bar to allow of taking up play with greater facility, thus assuring the parallelism of the wheels.

MOTOR CAR CARRIES ANIMALS

Not only individuals and firms have recognized the superiority of the power driven vehicle for numerous purposes, but also state and municipal authorities. Germany is noted for the excellence of municipal and chiefly sanitary institutions which are more developed than anywhere else and this car is another proof. Its purpose is to remove as quickly as possible dead or injured animals from the city streets. First of all the speed is much higher than the old method with teams, also that it is always ready at a moment's notice, and secondly, the motor can of course not be infected by any contagious disease. Proprietors of teams can seldom be hired even if well paid to carry on their carriages sick animals as they fear their horses would get sick through contagion. The chassis allows weighs up to 3,300 pounds and the inner available space is 110 inches in length, 50 inches in width and 70 inches in height, which is sufficient for the biggest and heaviest horse or steer. At the rear and on the left side there is a trapdoor for getting in and out. They are nailed with transverse wooden borders to give the animals some foothold when climbing up. To wind up the rear door counterweights are provided. Solid tires are used, single for the front wheels, double for the rear. If a carcass is to be loaded a platform is pulled out by chains, the body tied to it and the whole wound up by chains and a windlass.



WHITE AMBULANCE NOW ON DUTY AT TRENTON, N. J.

AMONG the Makers and Dealers

GIRL EMPLOYES OF FRANKLIN COMPANY ENJOY ANNUAL OUTING

Orders Overland—Charles W. Price, manager of the Chicago Overland branch, has closed with the Fawkes Automobile Co. for 100 cars for the Dakotas and Minnesota.

Cadillac Agent Spreading—The Berger Automobile Co., Cadillac agent in Cleveland, has taken a lease on a large building on Euclid avenue opposite the aristocratic Union Club, where large show and salesrooms will be fitted up.

New Battery Company—Articles of incorporation have been filed at Madison, Wis., by the Northwestern Storage Battery Co., of Milwaukee. The capital stock is $25,000, and the incorporators are: F. E. Scudder, Edgar J. Knapp and Edward McLaughlin.

New Plant in Oshkosh—The Termaat & Monahan Co., of Oshkosh, Wis., builder of gasoline engines, is erecting a new $35,000 foundry and machine shop of solid concrete construction, 75 by 250, two stories high. The company will employ 100 men after December 1. Its entrance into the motor car field has necessitated enlargement.

Robertson Plans Garage—Louis A. Robertson, Kansas City, Mo., has taken on the Franklin line and will handle it exclusively throughout the coming season. As soon as he can obtain them a full line of 1909 models will be exhibited in temporary quarters at 3018 Troost avenue. Plans have been prepared for a new building 65 by 185 feet, two floors of modern construction, steel and concrete being used throughout.

More Work For Pelletier—By an arrangement consummated last week, E. LeRoy Pelletier, advertising manager of the Everitt-Metzger-Flanders Co., will also handle all advertising of the Studebaker Automobile Co. It will be remembered the Studebaker company recently purchased one-half the output of the Detroit concern and assumed control of all western and southern territory. This so closely linked the interests of the two concerns it was thought advisable by the Studebaker company to have Pelletier handle all the advertising for the Studebaker line of high-priced touring cars, electrics and commercial power wagons with the E-M-F campaign.

Brittons Take Stoddard—R. D. and C. O. Britton will represent the Stoddard-Dayton in Hartford, Conn., for the season of 1909 and will also continue to carry the Maxwell.

Fisher's New Building—The Fisher Automobile Co., the oldest concern of its kind in Indianapolis, recently moved into its new three-story building at Vermont street and the Capitol avenue boulevard. On the south side of the garage proper is a small private park for the comfort of patrons of the company which has been furnished with benches, shade trees, flowers and a fountain. The building is three stories high and fireproof, occupying one-fourth of a city block. On the first floor is the salesroom, general and private offices, oil rooms, used car department, wash racks and a 12 by 20 elevator. The mezzanine floor is devoted to motor car toggery, while on the second floor is the wholesale jobbing accessory department and mail order department, together with the repair shop. There is an innovation on the second floor in the way of a club room, especially for drivers, whose employers patronize the company. In the club room are comfortable tables, chairs and reading material. Provision is made for shower baths. The third floor is devoted to dead storage and a tire repair department. The storage department has 55,000 square feet of space. Three separate entrances and exits are provided for cars. The Fisher Automobile Co. was founded some years ago by Carl G. Fisher. When the company moved into the new location from 330 North Illinois street there was some change in the heads of departments so that the present officers and managers are as follows: Horace L. Hewitt, president; Frank L. Moore, vice president and general manager; Carl G. Fisher, secretary; F. Ellis Hunter, accountant; John B. Orman, manager of the retail sales and advertising departments, and C. A. Oldham, with the G & J Tire Co. for some years, manager of the accessories department. During the past season the company has had the agency for the National, Stoddard-Dayton, Maxwell and Mitchell. Next season the company will represent the National, Stoddard-Dayton and Overland in Indianapolis.

Spur For Speedwell—The New York Central lines are engaged in laying a spur track to the Speedwell factory, in Dayton, O. This will give the company extra shipping facilities which it has been badly in need of. It is also installing another 125-horsepower boiler.

Oakland an Independent—The Oakland Motor Car Co., of Pontiac, Mich., has been elected to membership in the American Motor Car Manufacturers' Association. This company, of which Edward M. Murphy is president, and Alanson P. Brush vice-president, makes the two-cylinder car designed by Mr. Brush. J. B. Eccleston, of 59 Franklin street, Buffalo, is the sales manager.

Baum Handling Supplies—The Baum Iron Co., Omaha, Neb., one of the oldest established heavy hardware and carriage makers' supply houses in the west, has recently added to its line a department devoted exclusively to motor car supplies and accessories. This department is under the control of E. DePrez, for some time secretary and manager of the Neustadt Automobile and Supply Co., St. Louis. Omaha is particularly well-suited for supply business of this nature.

Boston Show Plans—Manager Chester I. Campbell, who has charge of the Boston shows, has sent out letters to the applicants for space at the next exhibition to be held in the Hub in March, that the drawings for spaces will take place during the present month. Already there are applications for practically the entire building. Mr. Campbell has not yet decided upon any scheme for decorations, but as the show does not come until the spring there is no hurry necessary on this point. He will visit the big shows in the other cities and get a line on what they are planning to do before he makes any

decision so that there will be no repetition in Boston's show. The exhibition will take place in Mechanic's hall again.

Kisselkar in Boston—The Kisselkar company is now occupying a fine salesroom on Boylston street, Boston, formerly used by the H. C. Stratton Co., agent for several lines of motor cars.

National Announcement—The National Sales Corporation announces that D. L. Herman is no longer representing it on the road. The announcement is also made that Pirelli cable can only be purchased through the National Sales Corporation or through the Motor Car Equipment Co., the importer.

Teddy Dey in for Himself—After having been associated with the George N. Pierce Co., of Buffalo, for 12 years, Forbes S. Dey, sometimes known as Teddy Dey, has resigned his position with that company to enter business for himself. Mr. Dey will from now on deal in Pierce-Arrow cars in Kansas City, Mo.

Motor Cycle Makers Organize—The Motor Cycle Manufacturers' Association has been formed and a show committee was appointed at its organization meeting. That body visited New York a few days ago to arrange for the motor cycle manufacturers to exhibit in a body at the selected shows of the several big cities. The association will exhibit in New York, Chicago and Boston. In New York its exhibits will be at the Madison Square garden show.

S. A. E. Employment Bureau—Among its numerous other activities, the Society of Automobile Engineers will henceforth maintain an information bureau for the mutual benefit of members seeking positions and of the manufacturers in need of additions to their technical staffs. As a matter of fact, the American manufacturers are now very largely represented in the membership, so that the innovation will result in benefiting members both ways. The names and qualifications of those seeking new positions will be kept on file, as will also the needs of makers desirous of filling vacancies in their engineering departments, or of employing additional men, and both will in future be published in the quarterly transactions of the society.

Peerless' Hub Location—The Peerless company's Boston branch is now located in its new salesrooms on Columbus avenue, which formerly was occupied as the Boston branch of the Diamond Rubber Co.

Herreshoff Company Formed—The Herreshoff Motor Co. is the title of a new concern just established in Detroit to undertake the manufacture of motor cars. C. F. Herreshoff, one of the sons of the famous yacht designer and until recently engineer in charge of the American and British Mfg. Co., Bridgeport, Conn., is the head of the new company and will probably give his name to the product. The latter is to consist of three cars, a 22, 25 and 40-horsepower machine, the power plants of which will probably be built in Bridgeport.

New Rambler Agent—The Rambler Automobile Co., of Kansas City, just organized, will control the sales of Rambler cars in Kansas and ajoining states. The new Rambler company is composed of men who have been identified with the vehicle and farm implement trade in the southwest for many years and a large number of implement dealers have already contracted to sell a portion of the output. The incorporators of the new company are W. L. Lacy, Estel Scott, George Devol, J. R. Nave and E. G. Anderson. The last named will act as general manager.

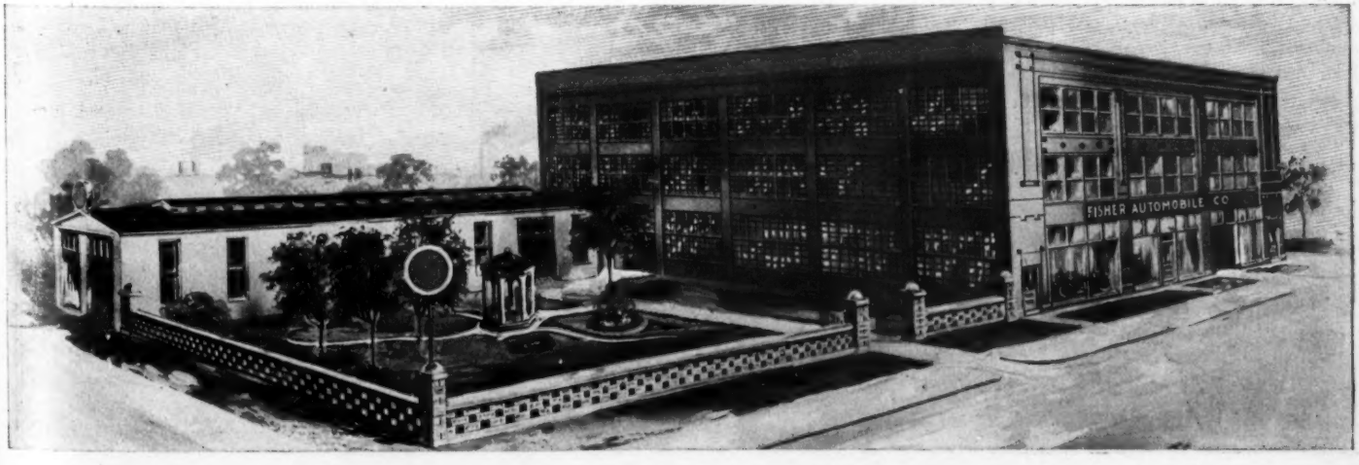
Rambler Moves in Boston—The Boston branch of Thomas B. Jeffery & Co. has moved from its quarters on Columbus avenue to 93 Massachusetts avenue. Ever since the old bicycle days the Rambler agency has been on Columbus avenue, but Manager V. A. Charles found the business was outgrowing the old location and he looked about for a new one. The new headquarters are right in the heart of the back bay district where so many motor concerns are now located, and there is room for at least ten machines on the ground floor, which is lighted by windows on three sides. The Firestone Tire and Rubber Co.'s Boston branch will shortly move from its old location at Park square to the quarters vacated by the Rambler on Columbus avenue.

Lowry With Moline—Frank Lowry, a former Indianapolis newspaper man, has signed a contract with the Moline Automobile Co. of East Moline, Ill., to handle publicity and advertising.

Stepney in New York—The American Stepney Spare Wheel Co., eastern distributer for the Spare Motor Wheel of America, Ltd., has moved from 341 Fifth avenue to a large show room at 1773 Broadway.

Knox Demonstrating Tour—The Knox company, of Springfield, began a campaign of publicity and demonstrations on October 1 throughout New England that is to last 2 weeks. Three of the model O 38-horsepower cars have been on the go each day touring from Boston to some of the big cities in eastern New England. When the cities are within a short distance of Boston the cars return to that city each night. A. P. Underhill and Frank Crockett, of the Boston branch, and A. E. Denison and William Bourque, from the factory, are handling the cars on the tour, and they have been very successful so far.

Will Make Electrics—Under the name of the Toledo Electric Vehicle Co., there was incorporated last week a new Toledo organization which will manufacture electrics. The nominal capital of the new corporation is $50,000, with the following names as incorporators: Willard E. Allen, A. F. Clark, Frederick B. Willard, P. J. Hall and J. W. Schaufelberger. The company leased a building on Collingwood and Delaware avenues, and will begin at once the work of manufacturing electric runabouts. The new concern has taken over the Allen & Clark company at 2014 Adams street. This is an experimental company with a nominal capital and was organized to develop a storage battery that was designed by A. F. Clark. Mr. Allen, who is the president of the Allen Mfg. Co., will head the new concern.



NEW PLANT OF THE FISHER AUTOMOBILE CO. JUST COMPLETED IN INDIANAPOLIS

Development Briefs

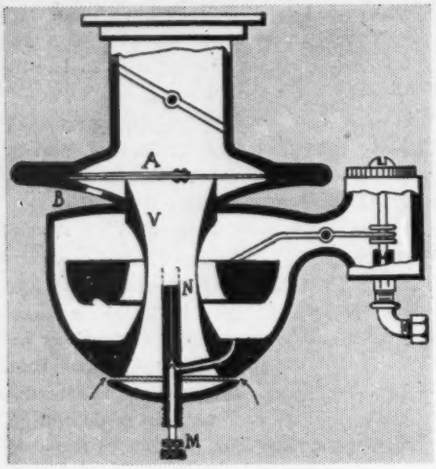


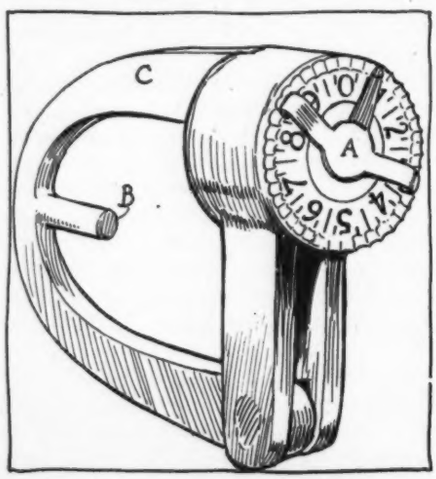
FIG. 1—SECTION BOWERS CARBURETER

ROCHESTER MOTOR CAR LOCK

The Rochester Safety Lock Co., Rochester, Ind., builds a lock for guarding motor cars which is not used in combination with the electric wiring system but is intended to prevent the steering gear from turning. It is a combination padlock, no key being used, but instead the owner has the choice of thirty-six combinations, which are obtained by the arms A together with a pointer which works over a dial graduated from 1 to 0. Within the lock is a set of three tumblers making the affair particularly safe in view of the fact that the casing is made of solid bronze inside and outside. In using the lock the steering column is drilled to receive the plug B, which is on the handle C of the lock. When so used the entire handle spans the steering column. The lock is made in three sizes to suit the different sizes of tubing. In order to use this lock in the dark, the pointer on the arms A operates over a series of notches, the zero notch being very large. By counting the clicks of the pointer it is possible to use the lock without a light of any nature. When not in use for anchoring the car, it can be used as a padlock on a tool box or other parts of the machine, so the owner finds it handy more ways than one.

BOWERS CARBURETER

The F. E. Bowers Co., New Haven, Conn., maker of the Bowers Jr. carbureter, introduces a novel diaphragm type of an auxiliary air valve which occupies a position A, Fig. 1, at the top of the venturi tube mixing chamber V, this chamber containing the usual type of spraying nozzle N which has its gasoline supply regulated through the needle valve M. Fig. 2 shows a plan view of the auxiliary diaphragm air valve, which is a disk with a central opening C, equal in diameter to the diameter of the top of the venturi tube. Through this opening passes all of the air which finds entrance by way of the venturi tube. Provision is made by a series of circular openings 1, 2 and 3, in this auxiliary air valve to admit air direct from the outside through three openings B, shown in Fig. 1. In entering the air must raise the flap spring or reeds S, S1 and S2, which cover these openings. One of these reeds S is broken away to show clearly the air opening 1. In the center of the reeds S1 and S2 are slots R, which vary the tension of these springs as compared with the reed S. The action of these flappers is very quick and it should not be overlooked that the air entering by these does pass the nozzle N so that there is due guarding against too rich a mixture on high motor speeds.



ROCHESTER MOTOR CAR LOCK

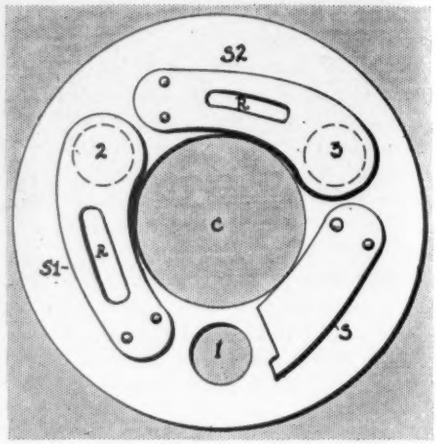
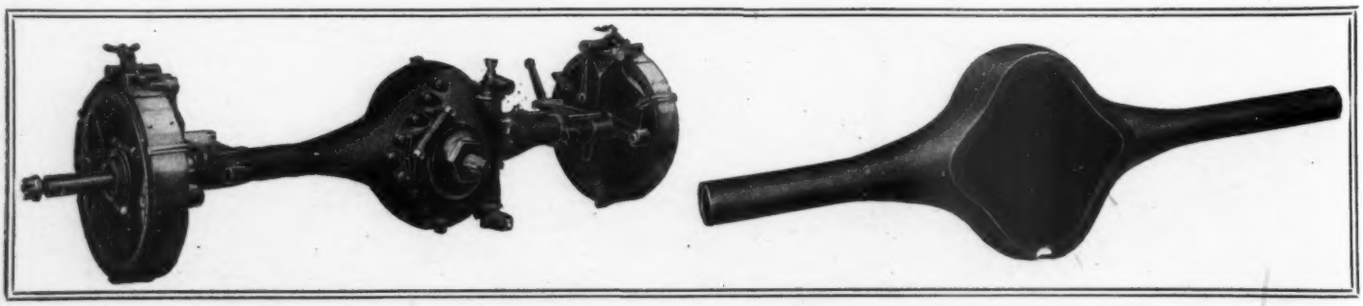


FIG. 2—BOWERS' AUXILIARY AIR VALVE

TIMKEN REAR AXLE

The new rear axle of the Timken Roller Bearing Axle Co., Canton, O., employs a one-piece pressed steel housing with a globular central part to contain the differential and having the rear face of this cut away, giving practically a rectangular opening to provide removal of the differential intact. In this housing the thickness of the metal decreases from the hub ends to the center, while the circumference of the tubing increases until it merges into the globular central part. This housing, being the entire load-bearing member of the axle and made without truss-rods of any nature, or external webbing, forms a particularly clean-cut rear axle, with nothing outside to vibrate, rattle or work loose. It is intended for use on cars weighing as high as 2,000 pounds empty and of horsepower under 45. The driving parts of this axle, of course, consist of the two driveshafts for driving purposes only and not sharing in the load carrying role. Between the axle housing and each rear wheel is a set of two Timken bearings and at either side of the differential is a single race of Timken rollers. The pinion on the rear end of the propeller-shaft is supported front and rear on Timken roller bearings. The company also has a new differential gear carrier and a new torsion bar arrangement.



TWO VIEWS OF TIMKEN 1909 AXLE WITH ONE-PIECE HOUSING